Accepting the unacceptable: Does intimate partner violence shape the tolerance of violence?

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Abstract

I study whether intimate partner violence (IPV) has a causal effect on victims' tolerance towards it in a context where divorce is very costly. First, I show theoretically that tolerance of violence can serve as a coping mechanism, particularly under prolonged exposure to abuse. I empirically test this hypothesis in the context of India. To do so, I leverage variations in the minimum legal drinking, employing a regression discontinuity design and an event study approach. The findings show a 4-5 percentage points increase in wives' likelihood of experiencing IPV as their husbands attain the legal drinking age. In the short-run, this does not lead to a change in wives' IPV tolerance. To study the effect of prolonged exposure to IPV on attitudes, I compare couples living in states with different legal drinking ages. I find that earlier legal drinking increases the exposure to violence by up to 6 months, which in turn leads to a 0.3 standard deviation increase in wives' tolerance towards violence. These findings suggest that the longer the exposure to violence, the more the victims may normalise and justify violence inflicted on them as a coping mechanism.

Keywords: Intimate Partner Violence, Gender Norms, Alcohol regulation

JEL Codes: J12, J16, D13, O15, I15

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1 Introduction

Tolerance towards intimate partner violence is widespread. Globally, 34% of women and 27% of men find intimate partner violence justifiable under certain circumstances (Demographic and Health Survey, DHS).[1] In many settings, violence is often justified as a strategy to *discipline* female partners who do not fulfil their expected roles. For example, 25% of women and 17% of men deem wife-beating justifiable if the woman neglects her children (DHS). Notably, previous research in economics shows a significant correlation between being a victim or survivor of intimate partner violence and accepting wife-beating (Heise and Kotsadam, 2015; García-Moreno et al., 2005).[2] However, little is known about the causal link between the experience of intimate partner violence and the tolerance towards it.

The interplay between harmful behaviours and the attitudes towards them is complex. While tolerant attitudes towards harmful norms can lead to the normalisation of these practices, thereby increasing their prevalence, such behaviours can also reinforce tolerant attitudes, perpetuating a cycle that exacerbates inequalities (Akerlof and Kranton, 2000; Alesina et al., 2013).[3] Extensive literature in economics has explored how harmful norms and behaviours originate (Anderson, 2007; Aguilar et al., 2021; Becker, 2022; Ashraf et al., 2020; Bishai and Grossbard, 2010; Corno et al., 2020b,a; Corno and Voena, 2023). However, the factors influencing attitudes towards these harmful practices remain unexplained. This paper aims to fill this gap, analysing the causal relationship between the experience of intimate partner violence and tolerance towards it.

I study whether harmful behaviour, such as intimate partner violence, has a causal effect on victims' attitudes towards it. Specifically, I investigate whether victims' tolerance towards violence could act as a strategy to reduce the net disutility victims receive from violence in contexts where women have limited outside options (i.e., the cost of divorce is too high). The main challenge in addressing this question is that the experience of violence and the tolerance of violence may mutually reinforce each other. For instance, if women cannot leave the relationship, they might cope with their partners' aggressive behaviours by justifying them (i.e., *coping* mechanism). Conversely, women who a priori find violence acceptable might be at higher risk of being in an abusive relationship (*risk factor* mechanism). These mechanisms may intertwine, forming a vicious cycle. As a result of such

[1] Own calculations using surveys from 50 countries to calculate the women's indicator and surveys from 45 countries to calculate the men's indicator. For more details, see Tables A.1, A.2, and Figures A.1 and A.2 in the Appendix. Figure A.3 shows a correlation between the tolerance of violence and the prevalence of IPV at the country level.

[2] In this paper, when I refer to victims, I include both victims and survivors of intimate partner violence. Indeed, many women who experienced IPV from their partner do not identify as victims (Ferraro, 2015).

[3] See, among others, (Baldiga, 2014; Bertrand et al., 2015; Bursztyn et al., 2020; Fernández and Fogli, 2009; Giuliano and Nunn, 2021; Jayachandran, 2015; Lowes et al., 2017) for examples of how norms can affect the economic development.

simultaneity bias, the relationship between violence and its tolerance is endogenous. Moreover, the relationship between experiencing violence and its tolerance may vary depending on whether we consider violence an isolated event or a recurrent issue.

To understand the nature of attitudes towards intimate partner violence in the short- and long-term, I adapt a model from Anderberg et al. (2023). In this simple conceptual framework, I study the dynamic relationship between exposure to intimate partner violence and tolerance towards it in a setting where exercising the outside option (i.e., divorce) is extremely costly for individuals. The model assumes two types of partners: violent types who are abusive with a high probability and non-violent types who have a small but positive probability of inflicting abuse. Violence is non-strategic, and the probability of abuse is contingent upon the type of partner. When the individual enters the marriage, they do not observe the type of partner they have been matched to. The individual updates their beliefs on whether their partner is a violent type based on the number of *violent signals* they receive. The realised violence decreases individual's expected utility within the marriage. At each period within the marriage, the individual decides the level of violence to tolerate. Changing their tolerance is costly as it generates disutility and is irreversible. As a result, the individual only changes their tolerance when they have received enough signals of their partner being a violent type. Interpreting these signals and adjusting her perceptions — or updating her Bayesian priors — based on their experience is gradual and requires time. As a result, the tolerance towards violence in the short- and long-term can differ. In particular, the individual's tolerance of violence may increase the longer their exposure to violence.

I investigate the causal relationship between violence and its tolerance in the context of India. This context is characterised by some of the highest rates of IPV and tolerance thereof. 31.7% of Indian women report having experienced IPV in their lifetime, and 46% deem domestic violence acceptable in some circumstances (NFHS, 2021).[4] Furthermore, the National Family and Health Survey indicates that 96% of these women remain married to their perpetrator, given the rarity and social stigma of divorce in India. Additionally, alcohol-related abuse is widespread (da Silva Maia et al., 2022). There is a strong positive correlation between experience of abuse and having a partner who drinks (NFHS, 2021). To isolate the causal effect of the experience of violence on tolerance of IPV, I exploit variation in the minimum legal drinking age (MLDA) within and across a subset of Indian states. I combine the variation in the legal drinking age with three waves of the National Family and Health

[4] Men's tolerance towards wife-beating is still extremely high but lower than women's. 27% of men report that wife-beating is justifiable in some cases (NFHS, 2021). Note that these figures differ from those presented in A.1 and A.2 because in India, respondents are also asked whether wife-beating is acceptable if the wife disrespects the in-laws and if she is unfaithful. In A.1 and A.2, I use the questions asked in every survey worldwide.

Survey (NFHS, 2005-2015-2020). These surveys report information about the prevalence of violence (both over the lifetime and in the past 12 months), its onset, and the wife's justifiability of violence in different scenarios, the age and the age at marriage (in months) of both partners, as well as the husband's alcohol consumption. The rationale behind leveraging the minimum legal drinking age variation is straightforward. Alcohol consumption often results in altered cognitive and physical capacities, potentially escalating the risk of inflicting violence due to reduced self-regulation (Hustad et al., 2009; Walters et al., 2018). Luca et al. (2015, 2019) explore alcohol bans and the MLDA policies in India, suggesting that men legally permitted to drink are more prone to violence. This paper builds on these studies, showing how alcohol-related policies might influence violence and, subsequently, attitudes towards such behaviour.[5]

To analyse the causal relationship between intimate partner violence and attitudes in the short term, I use a regression discontinuity (RD) design. Specifically, I study the impact of the prevalence of violence in the last 12 months on victims' tolerance of it. I compare observationally equivalent couples who differ on whether their husband's age is above or below the minimum legal drinking age at the month of the interview. I employ both a local non-parametric approach (Calonico et al., 2014) and parametric approaches. The NFHS data collect the respondents' month and year of birth and the month and year individuals were surveyed. This information allows me to compute the age in months of the individuals and identify those legally allowed to drink during the interview. I restrict the analysis to Indian states where the minimum legal drinking age was 25 from 2005 to 2020.[6]

To study the long-term effects of IPV on attitudes, I analyse how the length of exposure to violence changes attitudes towards it. To measure the length of exposure to abuse, I take advantage of a specific question collected by the NFHS. Women who reported having been a victim of IPV are also asked about the timing of the onset of violence in *years after marriage*. I assume that once IPV starts, then it lasts for the whole duration of marriage.[7] I implement an event study design where I compare observationally equivalent couples living in states where the minimum legal drinking age is 21 to couples in states where the minimum is 25 years old.[8] The hypothesis is that husbands who are

[5]My first-stage results corroborate and reinforce Luca et al. (2015) and Luca et al. (2019) 's findings by using a different identification strategy and a larger dataset. Moreover, I contribute both theoretically and empirically by separating the short-term and long-term effects of IPV on victims' tolerance of it.

[6]This choice is motivated by two key reasons. Firstly, the average age of marriage for Indian men in the sample is 23.5 years old, ensuring an adequate number of married men below the 25-year cutoff. Secondly, states with an MLDA of 21 (which could provide more statistical power) are not considered since 21 is also the legal age for marriage, posing a potential confounder.

[7]This is a reasonable assumption to make, as IPV is the crime category with the highest rate of recurrent victimisation (Flatley et al., 2010; Aizer and Dal Bo, 2009; Amaral et al., 2021).

[8]In order to make couples comparable I control for: duration of marriage, age of the husband, year of marriage, age of the husband interacted with the caste he belongs to, and cohort fixed effects allow me to compare women and men of the

allowed to drink after 21 years old are also more likely to start drinking earlier compared to husbands residing in states where the MLDA is 25. Thus – holding constant the duration of marriage – this would affect the timing of the onset of violence. As a result, the duration of abuse is likely to be higher among couples residing in states where the partners are legally allowed to drink at a younger age. This variation in MLDA across states allows me to investigate how the length of exposure to violence in the long term affects the attitudes towards it.

The short-term (regression discontinuity design) findings show that men above the minimum legal age are 12 percentage points more likely to consume alcohol. As hypothesised, the likelihood that their wives experienced abuse in the past 12 months increases by 4-5 percentage points. In the short-term, this surge in violence does not lead to a change in its tolerance. I further exploit an additional source of variation, considering the differences between upper and lower caste, for which the MLDA is less likely to be enforced. While MLDA policies are enforced more stringently in restaurants and bars, primarily frequented by the upper caste, individuals from the lower caste tend to consume cheaper spirits, often brewed at home (Jolad and Ravi, 2022; Kamei, 2014). I find negligible and statistically insignificant effects on alcohol consumption, violence and attitudes among couples belonging to the lower caste. In contrast, I document that husbands from the upper caste aged over the MLDA increase alcohol consumption by 23 percentage points, and their wives report a much higher occurrence of IPV (10 percentage points increase in the frequency of violence) compared to couples whose husbands' age is just below the age threshold. Nevertheless, even within the upper caste, where the MLDA's impact on men's alcohol consumption and intimate partner violence is large in magnitude and statistically significant, I still observe no short-term change in women's attitudes.

The long-term (event-study) findings show that in states where MLDA is lower, women report having experienced violence for 6 months more on average. I also find that wives' exposure to violence can increase their tolerance towards intimate partner violence (IPV) by up to 0.3 standard deviations four years after the partner has been legally allowed to drink. These findings suggest that the longer the duration of violence, the more the victims can find violence acceptable as a coping mechanism.

The contribution of this paper is threefold. First, I contribute to the literature on intimate partner violence by shedding light on whether there is a causal link between the prevalence of violence and the tolerance of it from the victims' standpoint. Economic research has consistently investigated determinants of intimate partner violence. Cross-cultural research suggests that the prevalence of

same age with the same marriage experience (same age of marriage and duration) in states where individuals are legally allowed to drink at 21 years old, compared to those living in states where the MLDA is 25 years old.

violence can be explained by historical legacies on gender roles (Tur-Prats, 2019; Alesina et al., 2021), and by current gender norms (González and Rodríguez-Planas, 2020; Heise and Kotsadam, 2015). Furthermore, several studies analysed the impact of labour market conditions and education on domestic abuse (Aizer, 2010; Anderberg et al., 2016; Tur-Prats, 2017; Bhalotra et al., 2021; Erten and Keskin, 2021, 2018). The literature has further focused on understanding what triggers the prevalence of violence. One interpretation is that violence is a means to increase the perpetrator's bargaining power in the household (Bloch and Rao, 2002; Bobonis et al., 2013; Eswaran and Malhotra, 2011). An alternative view is that violence generates direct utility to the perpetrator (Farmer and Tiefenthaler, 1997; Tauchen et al., 1991; Card and Dahl, 2011). Nevertheless, despite those contributions, it remains unclear whether experiencing IPV has a causal effect on the attitudes towards it. Psychology research explains this link with the theory of cognitive dissonance, which posits that victims adjust their attitudes to achieve consistency between their attitudes and experiences (Cash, 2012; Goodfriend and Arriaga, 2018).[9] However, this research lacks establishing a causal link. I fill this gap by testing this theory empirically with causal inference methods.

Moreover, contrary to most IPV literature that perceives violence statically, this paper leans on recent works recognizing its dynamic nature. For example, Adams-Prassl et al. (2023) develop a new dynamic model of abusive relationships where women have incomplete information about their partner's type (violent vs non-violent type), and abusive men have an incentive to use economic suppression to sabotage women's outside options and their ability to exit the relationship. Anderberg et al. (2023) develop a dynamic model centred on women's decisions regarding partnership, fertility, and labour amidst abusive relationships, where knowledge of their partner's nature accrues over time. This paper adapts the latter model developed by Anderberg et al. (2023) and proposes a simple conceptual framework that studies the dynamic relationship between exposure to intimate partner violence and the tolerance towards it in a setting where exiting abusive relationships is constrained.

Second, this paper speaks to the literature in economics that focuses on how gender norms originate and persist. Several studies provide evidence that ancestral and cultural characteristics can shape the evolution of norms and beliefs (Alesina et al., 2013; Ashraf et al., 2020; Giuliano and Nunn, 2021; Becker, 2022; Corno et al., 2020a). Similarly, existing evidence indicates that restrictive norms impose direct costs on those who deviate from them, reinforcing the persistence of these norms (Andrew et al., 2022; Guarnieri and Rainer, 2018). This paper is the first to study if and to what extent

[9] "The idea of a loving partner is dissonant with the idea that one's partner is aggressive and violent. To manage these clashing cognitions, victims may (consciously or unconsciously) engage in cognitive processes that minimise the apparent occurrence or impact of aggressive acts, reinterpret their perceptions of the perpetrator, and justify remaining in the relationship despite the aggression" Goodfriend and Arriaga (2018).

attitudes about harmful norms can be affected by the experience of harmful behaviours.

Third, this paper is related to the strand of the literature that focuses on policies' externalities on women's well-being. Recent works show the importance of the interaction between culture and institutions and how policies might impact women in a non-obvious way (Ashraf et al., 2020; Bau, 2021; Bhalotra et al., 2020; Ebenstein, 2014; La Ferrara and Milazzo, 2017; Schoellman and Tertilt, 2006; Tertilt, 2006; Erten and Keskin, 2018). This paper deepens our understanding of how policies might affect gender norms in the short and long term.[10]

The rest of the paper is organised as follows. In Section 2, I propose a simple conceptual framework to understand the relationship between IPV and the tolerance thereof, in the short- and long-term. In Section 3, I document the prevalence of violence and the tolerance towards it, and I describe the alcohol regulation in India. In Section 4, I discuss the data used for the estimation. In Section 5, I describe how I overcame the challenge of establishing a causal link between IPV and its tolerance in the short and long term, employing two different empirical strategies. In Section 6, I present and discuss the main results. Lastly, I conclude in Section 7.

2 Conceptual Framework

This section outlines a conceptual framework that models the relationship between the experience of intimate partner violence and victims' tolerance towards it in contexts where individuals have limited outside options. The model shows that when outside options are scarce and with prolonged exposure to violence, individuals may increase their tolerance of violence as a coping mechanism.

2.1 Set-up

Following Anderberg et al. (2023), I develop a framework of the behavior of individuals in a setup where there is heterogeneity among partners in their propensity to engage in abuse, and individuals have limited outside options, notably when the cost of separation is extremely high. I assume two types of spouses: violent and non-violent; the latter has a small but positive probability of inflicting abuse. A partner's propensity to abuse is modeled as non-strategic, meaning it is taken as given, contingent upon the partner's type. The partner's type, a fixed characteristic, remains unobservable

[10] This paper also contributes to the literature in economics that studies the role of alcohol regulation policies on gender-based violence. For instance, Barron et al. (2022) found that in South Africa, for every single week of the ban on alcohol during the COVID-19 pandemic, there were 105 fewer rapes. In India, Luca et al. (2015) find that in states that banned alcohol, men were less likely to consume alcohol and domestic violence was 50% lower. In Luca et al. (2019), the authors study the minimum legal drinking age in India, and they find that men who are legally allowed to drink are more likely to commit violence against their partners.By employing a different empirical strategy and more data, my paper builds on Luca et al. (2015) and Luca et al. (2019) and confirms their results on alcohol regulation on IPV.

to the other spouse upon marriage entry. The marriage match is assumed to be exogenous to the spouses' knowledge of each other's propensity for violence. This assumption is consistent with contexts, such as the Indian one, where arranged marriages are widespread, and the spouses often meet only around the time of the wedding.[11] When encountering violent signals, an individual revises their prior about their partner's nature. They can decide their level of tolerance towards violence. Changing this tolerance is costly (as it generates disutility) and is irreversible. Consequently, only after accumulating substantial evidence (through signals) of their partner's type does an individual recalibrate their tolerance levels, resulting in a gradual, albeit costly, shift in attitude towards violence.

2.1.1 Bayesian Learning

Consider a population of married couples, facing an infinite time horizon T = 0, 1... Each couple consists of two spouses (I refer to them as *spouse J* and *spouse K*). At time 0, the couple gets married. Any spouse K can be of two possible types, $v \in [0, 1]$: either *violent* ($v = 1$) or *non-violent* ($v = 0$). The spouse K's type is a fixed characteristic. When the spouse J gets married, they do not observe the type of their spouse. They update their beliefs about the type of spouse they have been matched to, based on the information they receive (violent and non-violent signals).[12] Both types of spouse K might be abusive. Spouses K with a violent nature commit intimate partner violence with a high frequency, whereas spouses K with a non-violent nature commit violence rarely. The conditional probability that the spouse J receives a violent signal given that their partner is of violent type is greater than the conditional probability that the spouse J receive a violent signal given that their partner is non-violent. Linking this model to my empirical approach, which draws upon variations in the minimum legal drinking age, we can interpret alcohol as a catalyst, leading to diminished control and inhibitions. This alcohol-induced effect is especially intensified for *violent* spouses.

Let P_0 be the spouse J's prior that their partner is violent. $P(\theta|v = 1)$ is the probability that the spouse J receives a violent signal (θ), given that their partner is of a violent type. Whereas $P(n\theta|v = 0)$ is the probability that the spouse J receives a non-violent signal ($n\theta$) given that their partner is of non-violent type. Signals are symmetric, meaning that the likelihood of receiving a signal is the same for both types of signals, conditional on the spouse K's true type.[13] This is to say that the probability that the spouse J receives a violent signal given their partner being violent is equal to the probability that the spouse J receives a non-violent signal given their partner being non-violent. Thus, for the sake of

[11] According to the Survey of Status of Women and Fertility, 70% of spouses meet on the day of the wedding or the month before.
[12] The match is assumed to be random.
[13] The symmetric assumption is not strictly needed, but it simplifies the mathematical expressions.

simplicity, we can write: $P(\theta|v = 1) = P(n\theta|v = 0) = P_\theta$.

Bayesian Learning at Time T-1 Suppose that up to time $T-1$, spouse J has received $k-1$ violent signals (i.e., θ) and $T-k$ non-violent signals (i.e., $n\theta$).[14] The individual updates their beliefs about their partner being of violent-type under standard Bayesian updating:

$$P_{T-1}(\theta^{k-1}, n\theta^{T-k})) = \frac{1}{1+(\frac{1-P_0}{P_0})(\frac{P_\theta}{1-P_\theta})^{(T-1)-2(k-1)}},$$

where $P_{T-1}(\theta^{k-1}, n\theta^{T-k})$ is the posterior probability that the partner is of violent type at time $T-1$ after the spouse J observed $k-1$ violent signals and $T-k$ non-violent signals.

Bayesian Learning at Time T At time T, they observe an additional signal (either violent or not), and their beliefs that their partner is of violent type update again:

$$P_T(\theta^k, n\theta^{T-k}) = \frac{1}{1+(\frac{1-P_0}{P_0})(\frac{P_\theta}{1-P_\theta})^{(T-2k)}},$$

where P_T is the posterior probability that their spouses' partner is of violent type at time T after observing k violent signals and $T-k$ non-violent signals.
See Appendix B for futher details and derivations of these calculations.

2.1.2 Victim's Expected Disutility

The individual's expected disutility from violence is as follows:

$$\pi = -\gamma \cdot [P_T \cdot P_\theta + (1-P_T) \cdot (1-P_\theta)] \cdot \tau - \beta(\tau' - \tau)^2,$$

where experiencing abuse is associated with a disutility $\gamma > 0$. $[P_T \cdot P_\theta + (1-P_T) \cdot (1-P_\theta)]$ captures the spouse J's perceived likelihood of experiencing violence based on their beliefs. τ' is the individual's initial level of intolerance of violence, such that $\tau' \in (0, 1)$, where $\tau' = 1$ means that the individual is extremely intolerant towards violence. The higher their intolerance towards violence, the more disutility they suffer from violence. Based on their current beliefs about the type of partner they are matched to, they decide the level of intolerance of violence. Specifically, the individual can opt for a new level of intolerance τ, where $\tau < \tau'$. The cost associated with opting for a new level of intolerance towards violence is given by: $\beta(\tau' - \tau)^2$. Changing their level of tolerance towards violence is costly because it generates disutility and is irreversible. $\beta > 0$ is a weight that determines how costly is for an individual to adapt their initial level of tolerance.

[14] Note that the exponentials $(k-1)$ and $(T-k)$ in the formulas are counts of occurrences of the signals.

The individual faces the following optimisation problem:

$$\min_{\tau} \pi = -\gamma \cdot [P_T \cdot P_\theta + (1 - P_T) \cdot (1 - P_\theta)] \cdot \tau - \beta(\tau' - \tau)^2$$

Based on their current beliefs about their type of partner, the individual chooses their optimal level of intolerance:

$$\tau = \tau' - \frac{\gamma}{2\beta}[P_T \cdot P_\theta + (1 - P_T) \cdot (1 - P_\theta)]$$

This indicates that the more the spouse believes their partner is violent, the more inclined they might be to adjust their tolerance. However, this adjustment is offset by the cost of adjusting (parameterised by β). The conceptual framework presented suggests that the individual might take some time to update their beliefs about the type of partner they are married to, based on the number of signals (violence) they receive. Once they update their beliefs, the spouse can decide to (i) leave the relationship if the cost of divorce is low or, (ii) remain in the relationship if the cost of divorce is high (stigma, legal barriers, etc.) as in the setting of this study. If the spouse remains in the relationship, after they update their beliefs about the partner, they might gradually decrease their intolerance about intimate partner violence threshold, as a coping device.

3 Background

3.1 Women's condition in India: IPV, tolerance of violence and divorce

Globally, one in four women report experiencing intimate partner violence (IPV) in their lifetime (WHO, 2021). In India, the country studied in this paper, the prevalence of violence is even higher. The most recent National Family and Health Survey (NFHS, 2021) indicates that 31.7% of ever-married Indian women have experienced IPV during their lifetime.[15] Less severe physical violence is the most prevalent (27.7%), followed by emotional/psychological violence (14%), severe violence (8.7%), and sexual violence (6.1%).[16] Furthermore, alcohol-related abuse is pervasive in India. Indian women with spouses who consume alcohol have a 3.11 times higher risk of experiencing intimate partner violence than those whose spouses abstain from alcohol (da Silva Maia et al., 2022).

[15]Calculations based on Individual Data Survey of the National Family and Health, 2019-2021. The application of domestic sample weights (provided by the NFHS) ensures representativeness. Only one married woman per household is eligible to respond to the Domestic Violence Module.

[16]Less Severe Physical Violence: actions like slapping, punching, twisting, pushing. Severe Physical Violence: actions causing notable harm such as kicking, strangling, burning, and weapon threats. Emotional/Psychological Violence: acts causing mental distress, e.g., humiliation, violent threats, insults. Sexual violence: non-consensual sexual acts, including forced intercourse or related actions

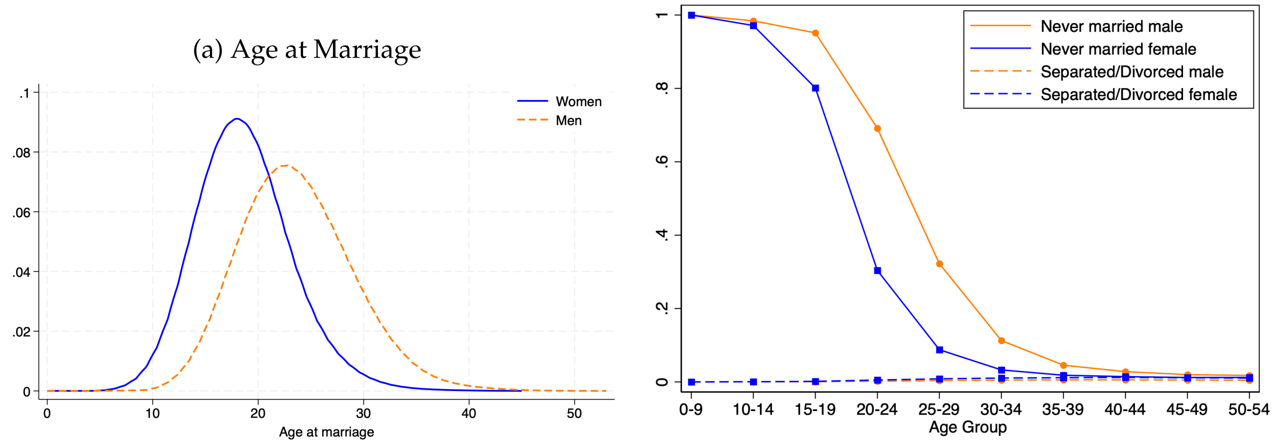
Tolerance towards wife-beating is also very high. The NFHS 2021 shows that 46% of Indian ever-married and never-married women deem wife-beating justifiable under certain conditions. Notably, while high, men's tolerance towards wife-beating is less than that of women, with 27% believing it acceptable in specific situations.[17]

Based on data from NFHS 2021, Figure 1a shows the age distribution at marriage for both genders. Women's average marriage age is 18.6 years old. Over 90% of women marry by age 25. Men generally marry later, with an average marriage age of 23.6. Divorce and separation are rare in India, as shown in Figure 1b. The 2011 Census of India records 1.36 million divorced individuals, constituting 0.24% of the married and 0.11% of the total population (Jacob and Chattopadhyay, 2016). The NFHS 2021 states that 0.34% of women have divorced, and 0.78% are separated. Indeed, the termination of a marriage is socially sanctioned and perceived as detrimental to a woman's reputation (Ragavan et al., 2015).[18]

Figure 1: Age at Marriage, Marriage, Divorce/Separation in India

(a) Age at Marriage

(b) Marriage and Dissolution of Marriage Rates



Note: Panel (a) shows the age at marriage for women and men in India. Panel (b) shows the share of never-married women and men by age group, and the share of divorced and separated women and men. *Source:* Panel (a): National Family Health Survey 2019. Panel (b): Census of India 2011. These charts are a replication of Figure 1 of Beauchamp et al. (2021), using different data sources.

3.2 Alcohol regulation in India

Alcohol regulation in India is a prerogative of state governments. As a result, alcohol regulation policies vary across states, ranging from prohibition to different minimum legal drinking ages. Differences in alcohol regulation date back to the colonialism period and the independence in 1947.

[17]Calculations based on Individual Data Survey of the National Family and Health, 2019-2021. The application of sample weights (provided by the NFHS) ensures representativeness.

[18]According to the Survey of Status of Women and Fertility, 90% of women would not contemplate leaving their husbands if the husband was beating her or was a drunkard/ drug-addict.

During the British colonial occupation, alcohol production and consumption gradually increased and became a central component of Indians' lives. During the period of British occupation, together with the promotion of alcohol consumption, the first prohibitionary organisation (the Anglo-Indian Temperance Association, AITA) was founded in 1888 by the British MP William S. Caine (Luca et al., 2019). The success of the AITA, together with the protests against alcohol consumption, led the British rulers to establish the Excise Committee (1905) to control alcohol consumption through heavy taxation. This measure, however, restricted the local manufacture of alcoholic beverages and led to some replacement of traditional low-alcohol beverages by mass-produced, factory-made beverages (Sharma et al., 2010). Under British colonial rule, the upper classes embraced the consumption of foreign spirits, while socially and economically disadvantaged sectors of Indian society continued to rely on locally-produced country liquors (Sharma et al., 2010).

The temperance movement gained strength with the nationalist movement and Gandhi, who transformed the temperance movement into mass movements against alcohol seen as a symbol of colonial oppression Benegal (2005). They evolved a demand for total prohibition that led to the inclusion of a statement in favour of prohibition under Article 47 of the Directive Principles in the Constitution. However, the Constitution also provided that the liquor industry (and all aspects associated with it) fell within the spheres of the single states Benegal (2005). By independence, many Indian states had alternately prohibited, relaxed, and repealed alcohol laws. Following independence, some states initially attempted to enforce alcohol bans, but most ultimately relaxed prohibition due to the significant revenue generated by alcohol taxation.

Gujarat is the only state with a continuous history of prohibition of alcohol. Bihar recently (2016) introduced a ban on alcohol. Additionally, alcohol is prohibited in Nagadland, in some districts of Manipur and in the period 1995-2014 (that is part of the study period) in the state of Mizoram (Jolad and Ravi, 2022). Where it is legal, alcohol is taxed heavily at the state level, and major states derive 15% of their revenue from alcohol excise duties (Jolad and Ravi, 2022). In states where alcohol sale is allowed, the minimum legal drinking age ranges from 18 to 25.

According to Jolad and Ravi (2022), individuals belonging to the lower caste usually consume cheap distilled local spirits, and they are more likely to brew at home Kamei (2014). Thus, the minimum legal drinking age policy is likely to be not enforced among this particular group of individuals. The MLDA is more likely to be enforced in restaurants and bars, venues which are typically frequented by the upper caste. I will exploit this heterogeneity for my identification strategy.

4 Data and Descriptive Statistics

4.1 Prevalence of IPV and tolerance towards violence

I use data from the 2005, 2015 and 2020 cycles of the National Family and Health Survey (NFHS) to measure the prevalence of intimate partner violence and the attitudes towards it.[19] The NFHS is a nationally representative repeated cross-sectional survey that collects information on individual's economic and demographic background. The NFHS identifies the men and women who both declared being married/living together with each other. For the purpose of the analysis, I use the couple datasets, where the unit of observation is the couple in which both partners were interviewed.

Respondents are asked extensively about their health, alcohol consumption, and their attitudes towards violence. To measure the respondents' tolerance towards violence, I rely on some questions about tolerance towards wife-beating. Specifically, respondents are asked whether a husband is justified to beat his wife if she (i) goes out without his permission, (ii) neglects the children, (iii) argues with the husband), (iv) burns food and (v) refuses sexual intercourse, vi) is unfaithful, vii) disrespects the in-laws. Figure A.4 shows the variation of violence justifiability in the different scenarios. The situation in which IPV is the most accepted is when the wife disrespects the in-laws, with 38% of women reporting that violence is justified in that scenario and when the wife neglects the children, with 32% of women in the sample reporting that violence is tolerated in that context. Violence is much less tolerated when the spouse refuses a sexual intercourse with the partner, with 13 percent of women reporting that spousal violence is acceptable in that circumstance. Since my research question is focused on the relationship between IPV and tolerance of violence from the victims' perspective, I only focus on female respondents' attitudes towards IPV.

The NFHS collects information on actual experience of IPV from a subsample of eligible women. Only one married woman of reproductive age (age range 15-49) per household is asked about her experience of emotional, physical, and sexual violence. Measuring intimate partner violence can present challenges related to reporting. However, the NFHS addresses this issue by giving special attention to the domestic violence module questionnaire. The NFHS takes steps to ensure the safety and privacy of women by conducting the survey separately from the household survey and assigning trained female interviewers. The questionnaire is designed to encourage the full disclosure of violence, aligning with the guidelines provided by the World Health Organization (WHO). Figure A.5 shows that 27% of women reported having experienced some form of IPV in the last 12 months. 11% of women in the sample reported being victims of some form of emotional violence, and 32% reported to be victims of physical and/or sexual violence in the last 12 months.

[19]The National Family and Health Survey corresponds to the Indian Demographic and Health Survey

Importantly for my identification strategy, information on the month and year of the interview, as well as respondents' month and year of birth is collected.

4.2 Minimum-Legal-Drinking Age policies

Data on the Minimum-Legal-Drinking age in the period of this study (2005-2020) have been shared by Luca et al. (2019) and complemented by manually checking amendments to the laws using a digital repository named India Code which encompasses all Central, State, and Union Territory enactments and legislations. Luca et al. (2019) compiled a dataset of state-level laws on the minimum legal drinking age to consume alcohol in India. The MLDA varies significantly across Indian states. In some states the MLDA is 18 years old, the majority imposes the minimum age at 21 years old and between 2005-2021 the territory of Delhi and the states of Haryana, Himachal Pradesh, Maharashtra and Punjab set the MLDA at the age of 25 years (see Table 1). Note that not all Indian states are listed in Table 1, because information on alcohol regulation policies was not available for all states.

Table 1: Minimum-Legal-Drinking Age in India between 2005-2020

Alcohol-Regulation Policies between 2005-2021	Indian States
MLDA at 18	Kerala (until 2010), Rajasthan
MLDA at 21	Andhra Pradesh, Bihar (until 2016), Goa, Jammu and Kashmir, Jharkhand, Karnataka, Kerala (2010-2017) Maharashtra (in 2005 only), Madhya Pradesh, Tamil Nadu, Uttar Pradesh, West Bengalis
MLDA at 25	Delhi, Haryana, Himachal Pradesh (only 2005-6), Maharashtra and Punjab
Ban on Alcohol	Bihar (after 2016), Gujarat, Mizoram, Nagaland

Source: Data on alcohol regulation policies in 2005 was shared by Luca et al. (2019) and Luca et al. (2015). Information on amendments to the policies was manually checked through the *Indian Codes* repository. *Note*: This table presents the alcohol regulation policies (minimum-legal-drinking age and ban) that were implemented in the period between 2005-2020.

5 Empirical Strategy

In this section, I show the causal link between the experience of intimate partner violence and the victims' tolerance towards it. The causal identification exploits the variation generated by the minimum-legal-drinking age in a subset of Indian states and the age of the husband at the time of interview.

5.1 Identification of Short Term effects: Regression Discontinuity Design

In order to estimate the causal effect of intimate partner violence on attitudes towards it, I need to account for two different sources of endogeneity. First, there might be some unobserved characteristics that correlate both with intimate partner violence and the tolerance of it (omitted variable bias). Second, when studying the link between IPV and attitudes towards it, separating correlation from causation is very challenging because of the simultaneity bias. Indeed, women might select into abusive relationships if they find violence acceptable a priori, or they might learn to cope with aggressive behaviours from their partners when they are themselves victims. The aim of this identification is to break the reverse causality and isolate the effect of IPV on its tolerance.

To deal with sources of omitted variable bias and reverse causality, I identify the effect of violence on its tolerance by taking advantage of the Minimum Legal Drinking Age (MLDA) in states which set the minimum at 25 years old, in a RDD design. I implement a Regression Discontinuity Design (RDD) based on the age of the male partner within the couple. In the RDD analysis, I focus on couples living in states where the MLDA is 25; states with MLDA at 18 and 21 are not considered because 18 and 21 are also the legal age for marriage in the period considered (respectively for women and men), posing a potential confounder.[20] Employing a Regression Discontinuity Design, I therefore compare couples where the husband is legally allowed to drink (age beyond 25 yo) to those whose partner is not legally allowed to consume alcohol (age below 25 yo). In the absence of manipulation around the cut-off, husbands who are just above 25 should be similar to those who are just below 25. Therefore, if I observe any systematic difference in behaviour around the threshold after the legal minimum to drink, I can attribute it to the policy. I use a local non-parametric approach, with triangular kernel density function in the optimal bandwidth proposed by Calonico et al. (2014). I also allow for the optimal bandwidth to vary to the right and the left of the cutoff (Calonico et al., 2017).

In particular, I estimate the following equation:

$$Y_{ist} = \alpha + \beta D_{ist} + \gamma f(x_{ist} - MLDA) + \delta D_{ist} \times f(x_{ist} - MLDA) + \gamma_s + \eta_t + \epsilon_{ist} \tag{1}$$

for all $x_i \in (MLDA + h_r, MLDA + h_l)$,

where the Y_{ist} outcome of interest (husband's alcohol use/IPV/Attitudes) of respondent i in state s at time t. D_{ist} is dummy which takes the value of 1 the male partner's age is above the MLDA (25 years old, in months) and 0 otherwise; a linear function of the age (in months) centred on the discontinuity cut-off; a set of time-wave fixed effects η_t and locations (states) fixed effects γ_s. The key parameter of interested is β, that identifies the intention-to-treat (ITT) estimate. I present the robust bias corrected standard errors, clustered at the running variable level, as prescribed by Lee and Lemieux (2010).

Because I am interested on the effect of violence on attitudes towards it, it is important to verify that:

- the MLDA policy is enforced and that there is a change in the alcohol consumption at the cut-off

[20] Prohibition of Child Marriage (Amendment) Bill raised the age at marriage for women at 21 in 2021.

- there is a change in the prevalence of violence among women whose husbands are legally allowed to drink

5.1.1 Sample selection

In the Regression Discontinuity Design analysis, I restrict the sample to Indian states that, during the period from 2005 to 2020, enforced a legal minimum drinking age of 25 years old. This choice is motivated by two key reasons. Firstly, the average age of marriage for Indian men in the sample is 23.6 years old, ensuring an adequate number of married men below the 25 years old cutoff. Secondly, states with an MLDA of 21 (which could provide more statistical power) are not considered since 21 is also the legal age for marriage, posing a potential confounder. To mitigate selection bias, the analysis focuses specifically on couples where the husband was married before reaching the age of 25. The final estimation sample for the Regression Discontinuity Design consists of 12803 married couples. In 9697 couples, the woman was selected to answer the domestic violence module.

5.1.2 Validity Assumptions

The identification assumption is that individuals did not manipulate their treatment status. Lee and Lemieux (2010) suggest two strategies to test this assumption. First, there should be no discontinuity in the density of the running variable at the cut-off. Second, pre-determined couples' characteristics of the couples should be balanced around the cut-off. Figure A.6 shows the histogram of the age of the husbands in months (the score) and there is no visual evidence of a kink at the threshold. I then formally test the no discontinuity hypothesis using the Frandsen (2017) test for discrete variables; with a p-value = 0.3 I fail to reject the null hypothesis that the there is no discontinuity of the running variable around the cut-off. Table A.4 provides evidence of the continuity of the pre-determined characteristics. The Table shows the point estimates obtained by estimating equation 1 the pre-determined characteristics. All the pre-determined characteristics are balanced around the cut-off.

5.2 Identification of Long-term effects: Event Study Design

In this section I study how the relationship between the experience of intimate partner violence and the tolerance towards it may vary depending on the length of exposure of violence. In line with the conceptual framework presented in Section 2, I empirically test whether the coping mechanism may lead to more tolerance if women have limited outside options.

5.2.1 Empirical Intuition

In order to investigate whether the length of exposure to an abusive partner affects women's tolerance of violence, I exploit the variation generated by the Minimum-Legal-Drinking-Ages across different Indian states. I implement an Event Study Design to compare observationally couples living in states where the Minimum Legal Drinking Age is 21 to couples residing in states where the minimum is 25. My hypothesis is that husbands who are legally allowed to drink after 21, are more likely to start drinking *earlier* compared to husbands residing in states where the MLDA is 25. Thus, I would expect that - keeping constant the duration of marriage - men who are legally allowed to drink at 21, are more likely to start to beat their wives *earlier* compared to those living in states where the minimum is set at 25. Therefore, I would expect that duration of abuse is higher in states where the partner starts to be legally allowed to drink at an earlier age.

To compute the duration of abuse (in years) for each woman, I take advantage of an information collected by the DHS: women who reported to have been victim of IPV are also asked about the timing of the onset of violence. I assume that once IPV starts, it lasts for the whole duration of marriage. Indeed, domestic violence is the crime-category with the highest rate of recurrent victimisation Anderberg et al. (2023). I compare couples whose husband is younger and older than 21 years old, in states where the MLDA is 21 and states where the MLDA is 25. The couples are considered treated if they reside in states where the MLDA = 21 and if the husband's age is higher than 21 (i.e. the husband is legally allowed to drink). The control group consists of couples who reside in states where the MLDA = 25 years old.

The identifying strategy relies on the assumption that couples residing in states with MLDA =21 and states with MLDA =25 would have had parallel trends concerning the duration of abuse and attitudes towards violence before the husbands are legally allowed to drink (i.e. before the age of 21 years old).

5.2.2 Sample selection

The Event Study approach only considers couples where the husband's age at the time of the interview falls between 19 and 25 years. Couples where the husband is under 19 are excluded due to lack of data, while those where the husband is over 25 are omitted as control group members beyond this age may start drinking, which could affect the analysis. Moreover, the sample is limited to marriages that took place after 2005, when Minimum Legal Drinking Age (MLDA) policy data became available. As a result, the sample includes 5,941 married couples residing in states where the MLDA is either 21 or 25.[21]

5.2.3 Estimating Equation

In order to investigate whether the length of exposure to IPV affects women's tolerance of violence, I estimate the following equation:

$$Y_{ist} = \alpha + \sum_{m=-2}^{4} \beta_\tau \mathbb{1}(\tau = m) \times MLDA_s^{21} + \lambda_s + \delta_{ist} + \phi_{ist} + \zeta_{ist} + \kappa_{ist} + \mu_{ist} + \varepsilon_{ist}, \qquad (2)$$

where the dependent variable y_{ist} is the outcome variable for a woman i, in state s, at age t. $MLDA_s^{21}$ takes value 1 if in the state the MLDA is 21, and 0 if 25. $MLDA_s^{21}$ is interacted with event-year dummies, τ. τ denotes the event-year, defined so that $\tau = 0$ if the age of the husband is lower than 21 (when individuals are legally allowded to drink in states where the MLDA = 21), $\tau = 1$ if the husbands have been legally allowded to drink for one year, and so on. The policy should have an impact on men who are older than 21 at the time of the survey (leads) and should not affect individuals who are under-aged to consume alcohol (age<21yo). The omitted category is 20 years old. Thus, the dynamic impact of the policy is estimated with respect to the age in which men become legally allowed to drink in the treated states. Therefore, each estimate of β provides the change in outcomes in treated states relative to not-treated states. δ is duration of marriage fixed effect, and μ year of marriage fixed effects. ϕ is the age of the husband FE interacted with the caste he belongs to, ζ and κ are respectively men's and women's cohort fixed effect. Adding these fixed effects allow me to compare women and men of the same age, with the same marriage experience (same age of marriage and duration) in states where individuals are legally allowed to drink earlier on. The term λ indicates the state of residence fixed effect and control for time invariant characteristics that may be correlated with the outcome. Standard errors are clustered at state and age of the interview level.

6 Results

6.1 Correlation between IPV Prevalence and Tolerance of violence

Table 2 shows the simple correlation between the experience of intimate partner violence and the tolerance of it.[22]

[21] See Table A.3 for descriptive statistics of the estimating sample. As shown in Table A.3 the average age of the husband is 23.3 years old, and the wives are on average 20.7 years old. The average age of marriage for men is 20.3 yo, and for women is 17.7 yo. In this sample the average duration of marriage is 2.6 years. The average length of violence in couples that on average have been married for 2 years is of 0.64 years. If we condition the duration of abuse on couples where the wife has been victim of IPV in her lifetime, then the duration of abuse is 2.5 years.

[22] Coefficients derived estimating the following OLS equation:

$$Tolerance_{ist} = \alpha + IPV_{ist} + \mathbf{Z_{ist}} + \eta_s + \theta_t + \epsilon_{ist},$$

The first column of Table 2 shows that the experience of violence is associated with an increase of the tolerance towards violence by 0.29 standard deviations. This correlation is statistically significant at 1 percent level. The second column of Table 2 shows the correlation between women's attitudes around wife-beating and instances where wives have reported abuse in the past year by husbands who are usually or often drunk. The experience of abuse by husbands who are usually/often drunk is associated with an increase in wives' tolerance towards wife-beating by 0.26 standard deviations. There may be concerns that perceptions of wife-beating based on the reasons presented in the NFHS do not align with views on wifebeating attributed to alcohol-induced abuse. The former is potentially deemed 'justifiable' under specific circumstances, while the latter might be universally perceived as a violent act. Consequently, the correlations might be less distinct than if the data captured incidents of wifebeating unrelated to alcohol. However, the similarity of the coefficients presented in Table 2 helps to alleviate concerns regarding a weaker correlation in case of alcohol-induced violence.

Table 2: Correlation between attitudes towards violence and IPV

	Tolerance towards IPV [Index]	
Any violence (12 months)	0.291***	
	(0.012)	
Any violence (12 months) by a husband who is often drunk		0.259***
		(0.015)
Controls	Yes	Yes
District FE	Yes	Yes
Year of Interview FE	Yes	Yes
Clusters	718	718
Observations	43430	43430

Note: Table 2 represents the correlation between the experience of Intimate Partner Violence (IPV) on the woman's tolerance of violence. *Any violence (12 months)* takes value one if the woman reports to have experienced IPV in the last 12 months. *Any violence (12 months) by a husband who is often drunk* takes value one if the woman reports to have experienced IPV in the last 12 months and her husband is usually/often drunk. *Attitudes towards IPV* is a variance-weighted index following Anderson (2008) that combines women's tolerance of violence in different scenarios, namely if the wife: (i) argues with the husband, (ii) neglects kids, (iii) goes out without permission, (iv) burns food, (v) refuses sexual intercourse, (vi) is unfaithful and (vii) disrespects the in-laws. Controls include: age gap in the couple, caste, and education in years. *Source*: Own estimations using the National Family and Health Survey (NFHS 2015-2020). Note that NFHS-2005 was excluded from this analysis as it does not provide district identifiers.

where dependent variable tolerance index of woman i, in district s at time t. I combine the 7 gender attitude variables as presented in Figure A.4 into a variance-weighted index, following Anderson (2008). The explanatory variable IPV, takes value 1 if the respondent reports having experienced any form of violence from her partner in the last 12 months. I include district fixed effects η_s to control for any time invariant characteristics that might be correlated with the dependent variable. θ_t controls for time of the survey fixed effects and $\mathbf{Z_{ist}}$ includes a set of individuals' characteristics (age gap, spouses' caste, and spouses' education in years). Standard errors clustered at the district level.

6.2 Short term Results

Since I am interested in estimating the effect of IPV on tolerance towards it, exploiting the age variation generated by the MLDA in some Indian states, it is important to test whether the policy on the minimum legal drinking age has been enforced.

I begin my analysis by looking at the effect of the minimum-legal-age on the husband's alcohol consumption. Figure 2a summarises the relationship between husband's age in months (i.e. the running variable) and the reported alcohol consumption, in a 60 months bandwidth around the cut-off. The blue circles represent the average alcohol consumption in 6-months-size bins.[23] The dotted line represents the cutoff (25 years old and 0 months), and the horizontal lines represent the linear fit of the outcome variable, with the corresponding 95% confidence intervals. Visually, the existence of a jump at the cut-off is clear. Table 3 presents the results of estimating Equation (4), within the optimal bandwidth. The first column of Table 3 shows that husbands at the cut-off are 12.6 percentage points more likely to consume compared to the control group. This corresponds to a 40 percent increase in alcohol consumption. The estimate is statistically significant at five percent level. A plausible concern is the under-reporting of drinking habits just before reaching the legal age. However, based on the laws and regulations, sanctions apply to those who sell alcohol to underage individuals. Therefore, respondents should not feel disincentivised to under-report. Notwithstanding substantial law evasion, men are actually more likely to drink after the 25 years old threshold.

As a second step, I check if the minimum-legal-age policy has an impact on the occurrence of intimate partner violence. Figure 2b summarises the relationship between husbands age in months and the probability that the respondent reports experiencing any IPV during the last year, in a 60 months bandwidth around the cut-off. The blue circles represent the average alcohol consumption in 6-monthly bins. The dotted line represents the cutoff (25 years old and 0 months), and the horizontal lines represent the linear fit of the outcome variable, with the corresponding 95% confidence intervals. Visually, the existence of a jump at the cut-off is clear. Visually, violence seems to increase at the cut-off, suggesting that women whose partner is legally allowed to drink are also more likely to experience any form of violence occurred in the last 12 months. Columns 2, 3, 4 of Table 3 present the estimates from equation 4, within the optimal bandwidth and the effect of MLDA for each form of IPV experienced during the last year. Women whose husbands are legally allowed to drink are

[23] Alcohol consumption is coded as one if either the wife reports that the husband is drinking and/or if the husband self-report that he drinks alcohol. As a robustness, I run the same specification using as dependent variable the alcohol consumption as reported by the men and the women separately, as shown in Table A.8. The magnitude of the coefficients is consistent, in all the specifications the probability of consuming alcohol increases by 40% with respect to the average. When I use as dependent variable the alcohol consumption as reported by the women, however, the coefficient is not precisely estimated.

5.6 percentage points more likely to experience violence in the year prior the interview; however the estimate is not precisely estimated at conventional levels. The effect of MLDA on physical and sexual violence in the last 12 months is positive, but not statistically significant. Women whose husband is legally allowed to drink are 5.2 percentage points more likely to experience emotional violence (i.e. threat, humiliations and insults). Therefore, it seems that the emotional form of IPV is the one driving the main results. Columns 5, 6, 7 of Table 3 present the results of the effect of MLDA on the frequency of violence. The outcome variable takes value one if the respondent reports at least one of the form of violence listed in the DHS to occur *often* in the last 12 months. This measure should proxy for the intensity of violence. Table 3 shows that the MLDA increased the likelihood of being abused frequently for women whose husbands are allowed to drink at the cut-off by 4.2 percentage points and it is significant at 5 percent level.[24]

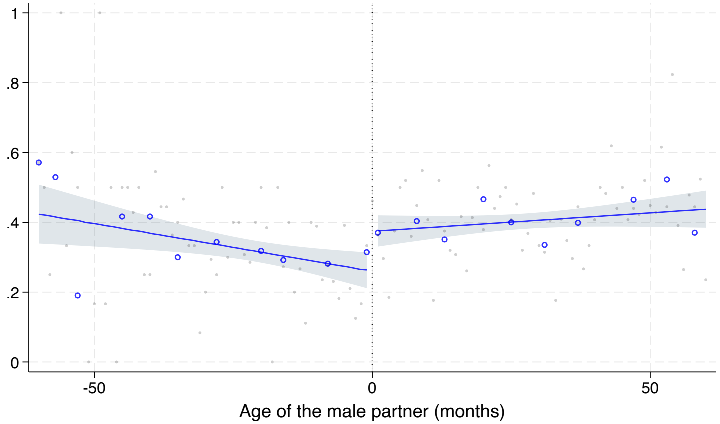
The results so far confirm that (i) men who are legally allowed to drink are actually more likely to drink at the cutoff and that (ii) women whose husbands are legally allowed to drink are more at risk to experience IPV. Given these findings, I now test the relationship between IPV and the tolerance towards it. Figure 2c summarises the relationship between husbands' age in months and the spouses' violence tolerance index, in a 60 months bandwidth around the cut-off. The blue circles represent the average alcohol consumption in 6-months-size bins. The dotted line represents the cutoff (25 years old and 0 months), and the horizontal lines represent the linear fit of the outcome variable, with the corresponding 95% confidence intervals. Visually, there is no evidence of breaks in the tolerance towards IPV around the cut-off. The no-effect on attitudes is confirmed in the last column Table 3 , that presents the ITT estimates based on estimating equation 4.[25] The last column of Table 3 shows no significant effect of violence on the tolerance of it. This result suggests that in the short-run, a higher prevalence of violence does not translate into a change in the tolerance of it, in line with the conceptual framework presented in Section 2.

[24]Using a different identification, and a largest dataset these results are in line with the findings of Luca et al. (2019) on the effectiveness of the MLDA policies on alcohol consumption and intimate partner violence.

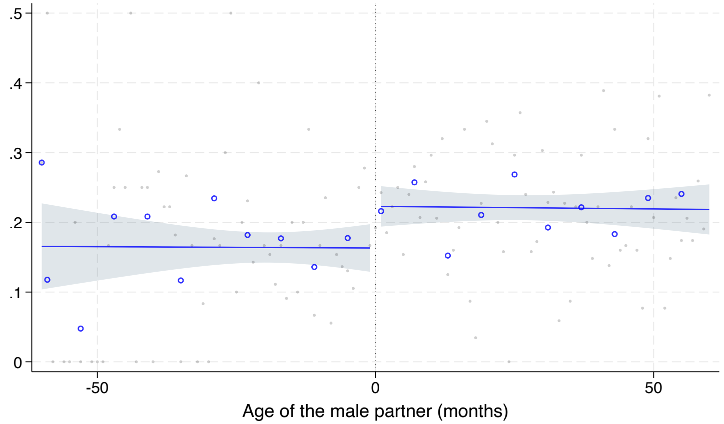
[25]Table A.9 presents the ITT estimates based on estimating equation 4, when instead of the tolerance index, a simple binary indicator is used. The indicator takes value one if the respondent deems wife-beating justifiable in at least one scenario, as presented in 4.

Figure 2: MLDA Discontinuity

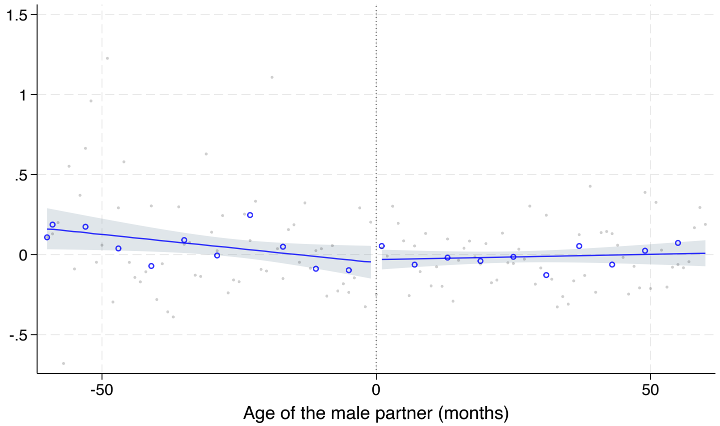
(a) MLDA discontinuity: Husband's alcohol cosumption



(b) MLDA discontinuity: IPV in the last 12 months



(c) MLDA discontinuity: Women's tolerance towards wife-beating



Note: The Figure 2 presents huband's alcohol consumption/wives' prevalence of IPV/ tolerance towards violence (following Anderson (2008)) against the age of the husband in months (X-axis), in a -60-60 months bandwidth. The blue circles represent the average of the outcome at score bins of size 6. In Figure 2a the outcome variable is a dummy taking value one if the husband consumes alcohol. In Figure 2b the outcome variable is a dummy taking value one if the wife reports to have been victim of IPV in the last 12 months. In Figure 2c the outcome variable is a variance-weighted index following Anderson (2008) that combines women's justifiability of wife-beating in 7 scenarios: (i) if she goes out without permission; (ii) if she neglects the children; (iii) if the argues with the husband; (iv) if she burns food; (v) if she refuses sex; (vi) if she is unfaithful; (vii) if she disrespects the in-laws *Source:* Own estimation using the National Family Health Survey (NFHS 2005-2015-2020).

Table 3: Short-term effects

	Husband Drinks	IPV in the past year			Frequent IPV in the past year			Tolerance index
		Any	Phys. & Sex.	Emotional	Any	Phys. & Sex.	Emotional	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Above MLDA	0.126**	0.056	0.025	0.052***	0.042**	0.027	0.020	0.071
SE	(0.059)	(0.033)	(0.034)	(0.021)	(0.022)	(0.018)	(0.015)	(0.142)
Left BW	35	40	35	33	35	39	37	35
Right BW	93	109	109	97	74	100	68	118
N	3,237	3,857	3,773	3,372	2,637	3,527	2,432	5,100
Mean of control	0.318	0.171	0.145	0.079	0.052	0.041	0.024	0.027

Notes: Table 3 reports the estimated coefficients based estimating a local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score, as presented in equation 1. The regression-discontinuity design exploits the within states variation generated by the MLDA, comparing couples whose husband's age is just below and above the minimum age at drinking. The sample consists of couples residing in states where the MLDA is 25. All specifications include wave and state fixed effects. The dependent variable of column (1) is measured as a binary variable coded as one if either the wife reports that the husband is drinking and/or if the husband self-report that he drinks alcohol. The dependent variables of columns (2), (3), and (4) are measured as a binary variable coded as one if the reported experiencing any form of IPV, any physical or sexual violence, and any emotional violence in the last 12 months. The dependent variables of columns (5), (6), and (7) are measured as a binary variable coded as one if the reported experiencing frequently any form of IPV, any physical or sexual violence, and any emotional violence in the last 12 months. The dependent variable of column (8) is a variance weighted index following Anderson (2008) that combines women's justifiability of wife-beating in 7 scenarios: (i) if she goes out without permission; (ii) if she neglects the children; (iii) if the argues with the husband; (iv) if she burns food; (v) if she refuses sex; (vi) if she is unfaithful; (vii) if she disrespects the in-laws. Robust bias corrected standard errors clustered at the running variable level in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. *Source*: Own estimations based on National Family Health Survey (NFHS 2005-2015-2020).

6.3 Heterogeneity by Caste

As described in Section 3, lower castes usually consume cheap distilled local spirits, which are typically home-made. Therefore, one might expect that individuals belonging to the lower caste are less likely to attend venues like restaurants or bars where the policy on the minimum legal drinking age (MLDA) is more likely to be enforced, compared to informal venues like habitations. Consequently, the effect of MLDA could have a heterogeneous impact between lower and higher castes.[26]

Figures 3a and 3d illustrate the relationship between husbands' age in months and their alcohol consumption among the lower caste (Figure 3a) and the upper caste (Figure 3d). The figures demonstrate the differential effect of the MLDA policy on the two groups of individuals. Visually, we observe that the jump at the cut-off is much larger and more evident in the upper caste sample.

[26]Before showing the results, I present two standard validity checks for the RD design restricting the sample to individuals belonging to the lower caste and to the upper caste separately. First, there should be no discontinuity in the density of the running variable at the cut-off. I formally test the no discontinuity hypothesis using the Frandsen (2017) test for discrete variables. With a p-value= 0.473 in the low-caste sample, and a p-value= 0.887, I fail to reject the null hypothesis that the there is no discontinuity of the running variable around the cut-off in both samples (see A.7). Figure A.5 and A.6 provide evidence of the continuity of the main pre-determined characteristics in the sample of couples where the husband belongs to the lower caste and those where the husband belongs to the upper caste. The figures show the point estimates obtained by estimating the equation 1 on the pre-determined characteristics. All the pre-determined characteristics are not statistically significant and I can conclude that the predetermined covariates appear balanced around the threshold.

In Figures 3b and 3e, I repeat an analogous exercise as before. The figures illustrate the differential effect of the MLDA policy on the prevalence of intimate partner violence on low versus upper caste. We notice that the upper caste group display a large and clear jump at the cutoff, whereas there is no visual evidence of a break among the lower caste group.

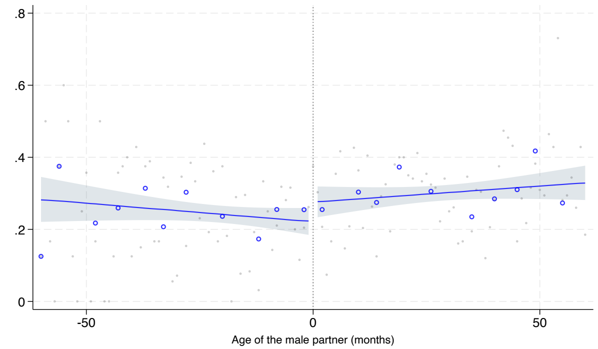
Finally, Figures 3c and 3f show the relationship between husbands' age in months and attitudes towards violence. In both figures there is no jump at the cut-off. Thus, also when we look at the upper caste group, where the effect of the MLDA on violence is very significant, we do not find any statistically significant effect on tolerance towards it.

Table 4 summarises the results and present the estimates of equation 1 on husbands' alcohol consumption, IPV and attitudes towards violence splitting the sample in low and upper caste. The effect of MLDA on husbands' alcohol consumption is much bigger (23.5 percentage points) and statistically significant for those belonging to the upper caste. At the cut-off the prevalence of violence increases in the upper caste wives sample. The effect of the MLDA is not statistically significant in the sample of the low caste respondents. When we look at the intensity of violence, respondents among the upper caste report to experience often any form of IPV when their husbands is legally allowed to drink. The tolerance coefficient is not statistically significant, confirming that a higher prevalence of violence in the short run does not reflect in a change of attitudes towards it.

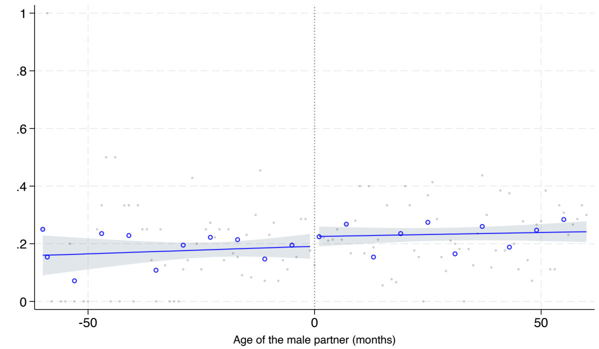
These findings are in line with the idea that MLDA is more likely to be better enforced in restaurants and bars, venues which are typically frequented by the upper caste. Lower caste individuals, on the other hand, usually consume cheap distilled local spirits (Jolad and Ravi, 2022) and in some states are more likely to brew at home (Kamei, 2014).

Figure 3: MLDA discontinuity, Heterogenous Effect by Caste

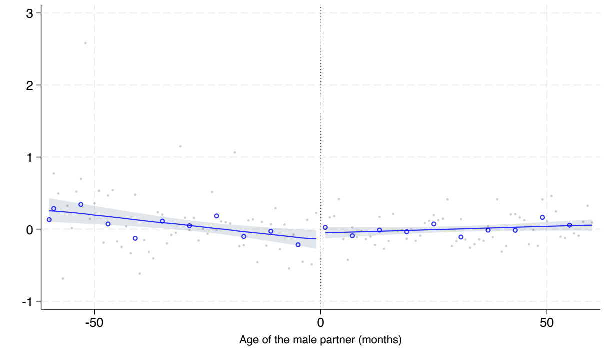
(a) Husband's alcohol consumption - Lower Caste



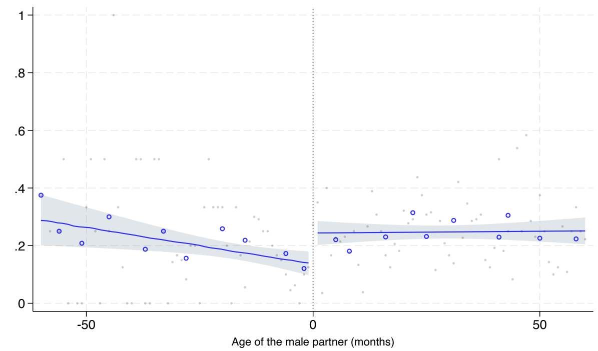
(b) Any violence in the last 12 months - Lower Caste



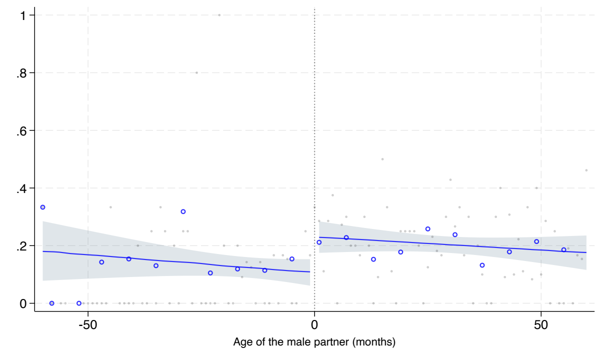
(c) Tolerance towards wife-beating - Lower Caste



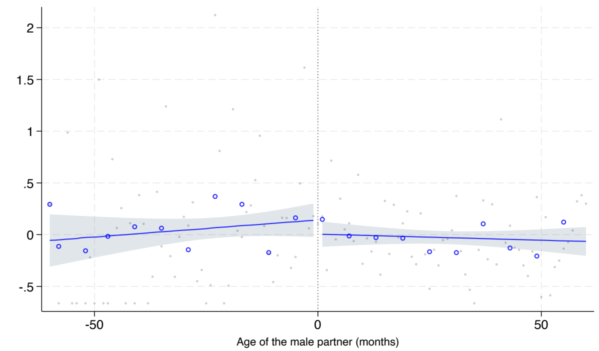
(d) Husband's alcohol consumption - Upper Caste



(e) Any violence in the last 12 months - Upper Caste



(f) Tolerance towards wife-beating - Upper Caste



Note: Figure 3 presents the outcomes *alcohol consumption*, *prevalence of violence in the last 12m*, *women's tolerance towards wife-beating* against the age of the husband in months (X-axis), in a -60-60 months bandwidth, for the Lower (Figures: 3a, 3b, 3c) and Upper Caste Sample (Figures: 3d, 3e, 3f). The blue circles represent the average of the outcome at score bins of size 6. *Source*: Own estimations based on National Family Health Survey (NFHS 2005-2015-2020).

Table 4: Short-term Effects – Heterogeneity by Caste

Panel A: Lower Caste

	Husband Drinks	IPV in the past year			Frequent IPV in the past year			Tolerance index
		Any	Phys. & Sex.	Emotional	Any	Phys. & Sex.	Emotional	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Above MLDA	0.103	0.017	-0.006	0.031	0.017	0.009	0.003	0.156
SE	(0.085)	(0.039)	(0.039)	(0.029)	(0.027)	(0.024)	(0.021)	(0.170)
Left BW	37	39	37	34	38	40	35	36
Right BW	74	107	104	140	114	121	102	133
N	1,645	2,334	2,256	3,030	2,466	2,583	2,201	3,583
Mean of control	0.337	0.190	0.157	0.093	0.055	0.043	0.024	0.015

Panel B: Upper Caste

	Husband Drinks	IPV in the past year			Frequent IPV in the past year			Tolerance index
		Any	Phys. & Sex.	Emotional	Any	Phys. & Sex.	Emotional	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Above MLDA	0.235***	0.111	0.076	0.103***	0.098***	0.072**	0.053***	-0.099
SE	(0.085)	(0.054)	(0.053)	(0.030)	(0.032)	(0.030)	(0.017)	(0.159)
Left BW	29	20	20	30	29	30	34	41
Right BW	85	66	64	88	64	75	69	89
N	1,035	769	739	1,084	784	939	872	1,514
Mean of control	0.290	0.140	0.126	0.053	0.048	0.039	0.024	0.056

Notes: Table 4 reports the estimated coefficients based estimating a local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score, as presented in equation 1. The regression-discontinuity design exploits the within states variation generated by the MLDA, comparing couples whose husband's age is just below and above the minimum age at drinking. The sample consists of couples residing in states where the MLDA is 25. All specifications include wave and state fixed effects. The dependent variable of column (1) is measured as a binary variable coded as one if either the wife reports that the husband is drinking and/or if the husband self-report that he drinks alcohol. The dependent variables of columns (2), (3), and (4) are measured as a binary variable coded as one if the reported experiencing any form of IPV, any physical or sexual violence, and any emotional violence in the last 12 months. The dependent variables of columns (5), (6), and (7) are measured as a binary variable coded as one if the reported experiencing frequently any form of IPV, any physical or sexual violence, and any emotional violence in the last 12 months. The dependent variable of column (8) is a variance weighted index following Anderson (2008) that combines women's justifiability of wife-beating in 7 scenarios: (i) if she goes out without permission; (ii) if she neglects the children; (iii) if the argues with the husband; (iv) if she burns food; (v) if she refuses sex; (vi) if she is unfaithful; (vii) if she disrespects the in-laws. Panel A displays the results restricting the sample to individuals belonging to the Lower Caste. Panel B displays the results restricting the sample to individuals belonging to the Upper Caste. Robust bias corrected standard errors clustered at the running variable level in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.
Source: Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

6.4 Robustness Checks

In this section, I carry out several sensitivity analyses and alternative specifications to address the robustness of my results.

6.4.1 Sensitivity to the bandwidth choice

Figure A.7 assesses the sensitivity of the results with respect to the choice of alternative bandwidth. I address the issue of alternative bandwidth by plotting the estimates of regressions where the bandwidth is increased by 10% on the left of the cut-off and decreased by 10% on the right of the cut-off. The figures also show estimates in the optimal bandwidth marked in blue, using the algorithm proposed by Calonico et al. (2014). The point estimates of the treatment effect are very stable and do not vary dramatically with the bandwidth size. Figure A.8 shows the sensitivity to the coefficients, restricting the sample to couples belonging to the Upper Caste. Figure A.9 shows the treatment effects estimated in a 12, 24, 36 and 48-months bandwidths. Figure A.10 shows the treatment effects estimated in a 12, 24, 36 and 48-months bandwidths, restricting the sample to couples belonging to the Upper Caste. The magnitude of the coefficients is stable across the board. However, as expected the smaller the window around the cut-off the larger the magnitude of the coefficient but the lower the precision.

6.4.2 Exclusion of Delhi

In the estimating sample I include the couples residing in the National Capital Territory of Delhi, because in the period considered the legal minimum to drink was 25 years old.[27] Being a city, it is much easier to access alcohol in neighbouring states where the minimum legal to drink is lower (for instance, Uttar Pradesh has the MLDA at 21 years old). Therefore, I expect that including Delhi in my analysis might introduce some noise. Tables A.13 and A.14 present the results without including the couples who reside in Delhi. The results are stronger in magnitude with respect to the main specification presented in the main results and statistically significant.

6.4.3 Past exposure to abuse

Pollak (2004) analyses a model of intergenerational domestic violence, suggesting that individuals who grew up in violent homes tend to marry individuals who grew up in violent contexts. Given this, there might be concerns that the results are biased due to a selection effect, driven by those who grew up with abusive fathers. The NFHS asks both male and female respondents whether their father inflicted violence to their mothers. I therefore run the main specification based on equation 1 by excluding respondents who either reported having a violent father or responded with "I don't know." Tables A.15, A.17, A.16 present results after excluding couples where either the husband's or the wife's father was abusive towards their mother. These results align with the main findings, suggesting that my conclusions are not driven by a selected sample with a history of familial abuse.

6.4.4 Alternative Specifications

While controlling for covariates is not essential in RD designs, their incorporation can be beneficial in mitigating bias from observations further away from the cut-off. Additionally, if these covariates are correlated with the outcome, their inclusion can enhance precision and identify potential issues in the empirical strategy. Notably, substantial changes in the estimated effects due to covariate inclusion

[27] In March 2021, Delhi set the MLDA at 21 years old, https://www.hindustantimes.com/cities/delhi-news/old-drinking-age-despite-new-excise-policy-in-place-101642630447547.html

may compromise the credibility of the identification strategy. Therefore, the inclusion of covariates serves as an additional test of internal validity. Tables A.18, A.19 and A.20 show the estimated coefficients of the treatment effect, after the inclusions of individual characteristics and the results are in line with the main ones presented in Table 3.

Tables A.10, A.11 A.12 show that the results are robust when controlling for a local quadratic function of the forcing variable.

6.4.5 Placebo Tests

Table A.21 provides a placebo check, confirming that there are no jumps in the likelihood of alcohol consumption, the prevalence of violence, or attitudes towards it at the 25-year-old threshold in states with an alcohol ban. As additional robustness check, I use a method similar to the Randomisation Inference, following Young (2019). In particular, I construct fake hypothetical cut-offs and I estimate the main specifications. If I find significant results, then this might indicate that I am not capturing the effect of being above the minimum legal drinking age. To implement this test, the following steps have been undertaken: 1) I create a dummy Above MLDA, using a random number generator, assigning 1 to 90% of the overall sample (mimicking the ratio of treated individuals in the original sample), 2) I run the specification based on equation 1 and record the t-statistics from each estimation. 3) I then repeated the steps 1000 times for all the main outcomes and plot the distribution of t-statistics to see the percentage of times I find a significant effect. I present the distribution of t-statistics for all results in Figures A.11, A.12, A.13. Across all outcomes, I identify a significant treatment effect in less than 3.3% of the models. This outcome suggests a minimal likelihood that the effects I have detected could be ascribed to random fluctuations or chance. Instead, the evidence provides substantial support that the effects detected are indeed coming from the variation generated by the minimum-legal-drinking age.

6.4.6 Inference

Kolesár and Rothe (2018) demonstrate that the practice of clustering by the running variable may not effectively resolve specification bias problems in discrete RDD setting. Recent papers such as Canaan (2020) and Takaku and Yokoyama (2021) propose to use the conventional robust standard error to the results of Kolesár and Rothe (2018). Table A.22 presents the estimates using the conventional robust standard error. In an additional specification, presented in table A.25, I cluster the standard error at district level. However, the information on the districts in available only for the 2015 and 2020 wave, therefore the survey conducted in 2005 is not included.

6.5 Long term Effects

In order to investigate whether the length of exposure to violence impacts the tolerance of violence, I compare couples living in states where the husbands can start to legally drink at 21 (treated) to couples living in states where the husbands are legally allowed to drink at 25. To do so, I estimate equation 2. Figure 4 displays the estimates of the outcome variables along with 90% confidence intervals. Estimates in Figure 4a show that when the husbands become legally allowed to drink in states with the MLDA at 21, men's alcohol consumption is higher compared to the counterparts in states where the MLDA is at 25. The estimated coefficient before the partner is legally allowed to drink is insignificant and close to zero, suggesting that there is not significant statistical difference in terms of alcohol consumption in states with MLDA at 21 and 25 among couples whose husband is 19. After 4 years in which the partner is legally allowed to drink, husbands in states where the MLDA is 21 are 20 percentage points more likely to drink with respect to their counterparts in states where the MLDA is 25.

Figure 4b shows the coefficients corresponding to the estimates for equation 2, where the outcome variable is the duration of abuse (in years). The coefficient in the pre-treatment period is not significant and close to zero. This suggests that the difference in duration of abuse between women living in states with MLDA 21 and states with MLDA 25 is close to zero at any point in time before 21 years old. After the partner becomes legally allowed to drink, the length of exposure to violence increases with respect to women living in states where the partner can drink after 25. After 4 years in which the partner is legally allowed to drink, the women report a duration of abuse which is approximately 6 months higher (0.56 years) with respect to their counterparts in states where the MLDA is 25.

Figure 4c shows the coefficients corresponding to the estimates for equation 2, where the outcome variable is the variance-weighted index of tolerance of violence. In the pre-treatment period, the coefficient is close to zero and not significant. This suggests that the difference in tolerance towards violence between women living in states with MLDA 21 and states with MLDA 25 is small at any point in time before 21 years old. In the first three post-treatment periods, we do not see a change on women's tolerance of violence, whereas, after four years in which the partner is legally allowed to drink, we notice a larger difference in the tolerance of violence among women whose husbands are legally allowed to drink for a longer time (0.3 standard deviations).[28]

These figures suggest that the longer the women are in an abusive relationship, the more likely they are to become tolerant towards violence if they have limited outside options.

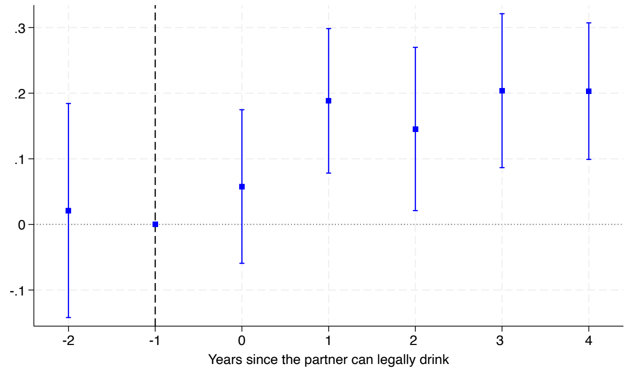
[28]There might be concerns of selection of couples who formed after 21 years old, when they were legally allowed to drink. Figure A.14 displays the estimates of the outcomes, when I estimate equation 5, restricting the sample to couples who got married before 21. The coefficients are less precisely estimated but in line with the main results presented in Figure 4.

Figure 5 illustrates the long-term outcomes for individuals after reaching 25 years of age in states with a Minimum Legal Drinking Age (MLDA) of 25. This is aligned with the findings in Figure 4. Data suggests that in states with an MLDA of 25, the initial differences in alcohol consumption, duration of domestic violence incidents, and related attitudes diminish over time as compared to states with an MLDA of 21. The gap narrows as husbands in states with MLDA at 25 start consuming alcohol.[29]

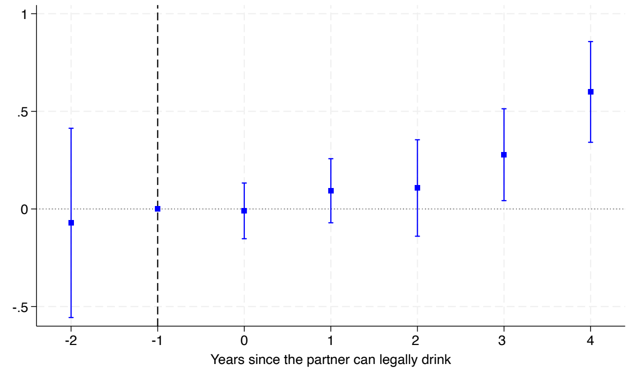
[29]Note that the coefficients between τ =0 and τ = 4 are slightly different with respect to those presented in Figure 4. The reason is because my events are the years within the marriage in which the partner can drink. Therefore, husbands aged 26 could potentially have gotten married at age 23 and therefore been drinking within the marriage for 3 years (and therefore be in the group t+3).

Figure 4: Long-term effects

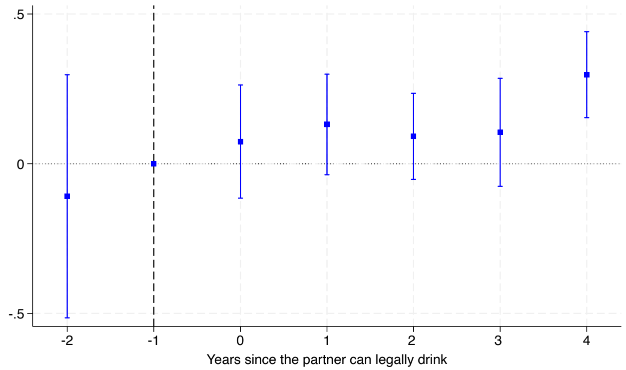
(a) Husband's alcohol cosumption



(b) Duration of abuse (years)



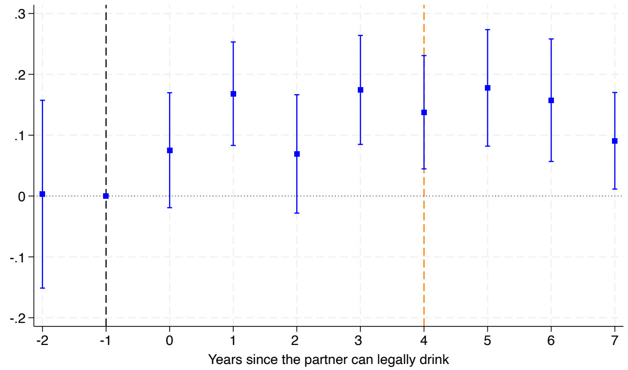
(c) Women's tolerance towards wife-beating



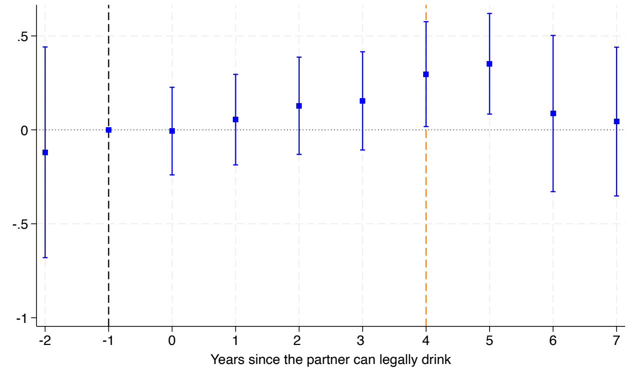
Note: Figure 4 reports the coefficient of the β from equation 2. The y-axis reports the estimated coefficient of the interaction between the years within marriage in which the partner can legally drink in states where the MLDA is 21 vs MLDA at 25. The event is identified as the years of being legally allowed to drink within the marriage. The x-axis represents years within the marriage the partner can legally drink. Omitted category: individuals aged 20 at the time of the interview. The sample is restricetd to couples whose husbands' age is between 19 and 25. The capped vertical bars show 90% confidence intervals calculated using robust standard errors clustered at the at the state and age at the interview level. *Source*: Own estimations based on National Family Health Survey (NFHS 2005-2015-2020).

Figure 5: Long-term effects – After 25

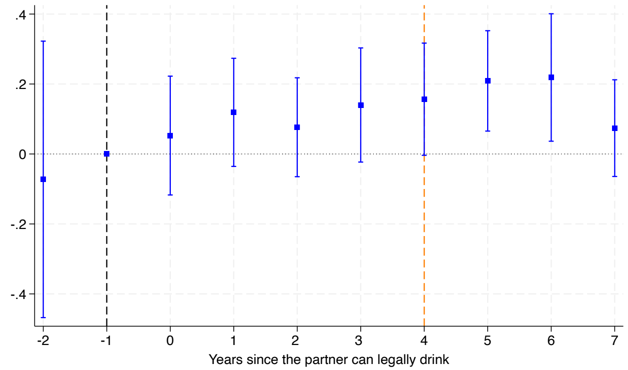
(a) Husband's alcohol cosumption



(b) Duration of abuse (years)



(c) Women's tolerance towards wife-beating



Note: Figure 5 reports the coefficient of the β from equation 2. The y-axis reports the estimated coefficient of the interaction between the years within marriage in which the partner can legally drink in states where the MLDA is 21 vs MLDA at 25. The event is identified as the years of being legally allowed to drink within the marriage. The x-axis represents years within the marriage the partner can legally drink. Omitted category: individuals aged 20 at the time of the interview. The sample is restricetd to couples whose husbands' age is between 19 and 28. The orange dashed line identifies when husband can legally drink in states there the MLDA is 25. The capped vertical bars show 90% confidence intervals calculated using robust standard errors clustered at the at the state and age at the interview level. *Source*: Own estimations based on National Family Health Survey (NFHS 2005-2015-2020).

6.5.1 Alternative mechanisms

In the following paragraphs, I discuss alternative mechanisms through which the legal drinking age may have affected women's tolerance towards violence, aside from a direct change in the prevalence of violence.

First, women's attitudes towards violence might be affected by a change in men's attitudes. Once they reach the legal drinking age, men might be more likely to attend bars/restaurants and create new social networks. Such interactions might subsequently shape their own attitudes towards violence and lead to a change in their wives' attitudes. I examine this potential channel by testing whether being legally allowed to drink affects men's attitudes towards wife-beating. Column (1) of Table 5 shows that being above the legal drinking age has no significant effect on men's attitudes towards wife-beating. Figure 6a shows long-term effects on men's attitudes towards wife-beating. The coefficients are insignigficant and not precisely estimated. The signs of the coefficients are negative, in the opposite direction to women's attitudes. Thus it is unlikely that women's attitudes are affected by a change in their husbands' view. Thus I conclude that this mechanism is unlikely to be at work in this setting.

Second, women's attitudes towards violence could be affected by an increase in men's unemployment. If, for example, men face more unemployment after reaching the MLDA due to increased alcohol consumption, the resulting household stress might influence women's tolerance of violence or aggression. To examine this channel, I test whether the minimum legal drinking age increases the likelihood of men being unemployed. In the data, I find insignificant effects in the short run, as shown by Column (2) of Table 5. Figure 6b shows men's unemployment in the long-run. After three years in which the husband has been legally allowed to drink, the effect on unemployment is close to zero and not statistically significant. After 4 years in which the husband can legally drink, the coefficient indicates that the husbands' probability of being unemployed decreases. The sign of this coefficient goes against the hypothesis that higher unemployment should lead to a change in women's attitudes. Therefore, I conclude that, in this context, this channel is unlikely to be the one driving the effect.

Third, women's attitudes might be affected by migration. For instance, if men migrate to states with different alcohol regulations, their interactions with women of diverse cultural backgrounds can subsequently shape women's perspectives on violence. To test this potential mechanism, I examine whether the being above the MLDA increases men's likelihood to migrate.[30] Column (3) of Table 5 indicates that there is no significant effect on the probability of the husband to migrate. Figure 6c confirms the short-term effect; the coefficients are all close to zero and insignificant. Thus, I can rule out the migration mechanism too.

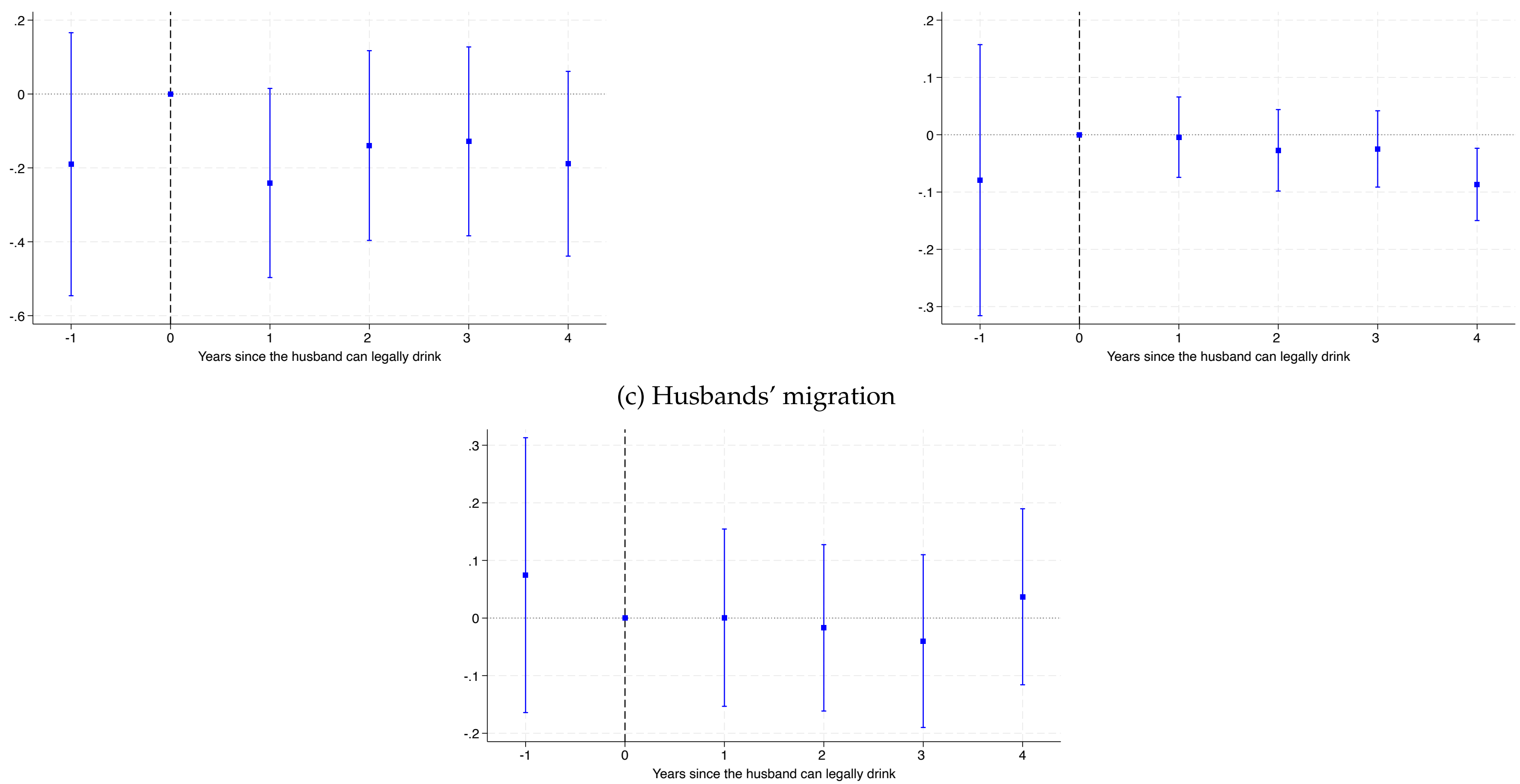
Table 5: Alternative Mechanisms, Short-term

	Husband's attitudes (1)	Husband's unemployment (2)	Husband ever migrate (3)
Above MLDA	0.018	0.020	-0.039
SE	0.116	0.018	0.035
P-Value	0.543	0.176	0.353
Left BW	30	34	30
Right BW	117	124	117
N	5,010	5,463	5,015
Mean of control	0.134	0.920	0.686

Notes: Table 5 reports the estimated coefficients based estimating a local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score, as presented in equation 1. The regression-discontinuity design exploits the within states variation generated by the MLDA, comparing couples whose husband's age is just below and above the minimum age at drinking. The sample consists of couples residing in states where the MLDA is 25. All specifications include wave and state fixed effects. The dependent variable of column (1) is a variance weighted index following Anderson (2008) that combines husbands' justifiability of wife-beating in 7 scenarios: (i) if she goes out without permission; (ii) if she neglects the children; (iii) if the argues with the husband; (iv) if she burns food; (v) if she refuses sex; (vi) if she is unfaithful; (vii) if she disrespects the in-laws. The dependent variable of column (2) is a binary variable coded as one if the husband is unemployed. The dependent variable of column (3) is a binary variable coded as one if the husband has ever migrated. Robust bias corrected standard errors clustered at the running variable level in parentheses. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. *Source*: Own estimations based on National Family Health Survey (NFHS 2005-2015-2020).

[30] The NFHS asks how many years the respondent has been living in the place in which he has been interviewed. I created an indicator variable taking value one if the respondent answered to not have been living in the same location, and 0 if he answers that he has always been living in the same location.

Figure 6: Alternative Mechanisms, Long-term



(a) Husbands' Attitudes towards violence

(b) Husbands' unemployment

(c) Husbands' migration

Note: Figure 6 reports the coefficient of the β from equation 2. The y-axis reports the estimated coefficient of the interaction between the years within the marriage in which tha partner can legally drink in states where the MLDA is 21 vs MLDA at 25. The x-axis represents the years since the husband can legally drink relative to 21 years old, and consequently the years in which the husband was legally allowed to drink. Omitted category: individuals aged 20 at the time of the interview. The capped vertical bars show 90% confidence intervals calculated using robust standard errors clustered at the at the state and age at the interview level. *Source*: Own estimations based on National Family Health Survey (NFHS 2005-2015-2020).

7 Conclusions

This paper studies the relationship between intimate partner violence and victims' tolerance towards it in India, where women's external exit options are very restricted or costly. Specifically, I investigate if victims' tolerance to violence serves as a coping mechanism, and how this mechanism may differ from short-term to prolonged abuse exposure. To understand the dynamics of attitudes towards intimate partner violence in the short- and long-term effect, I propose a simple conceptual framework that analyses how women in settings with constrained outside options, adjust their tolerance to violence based on their husbands' potential abusive behaviour. By exploiting the variation within and across Indian States and combining it with the date of birth of the husbands, I can explore whether women who are abused by their intimate partners are more likely to or not to condone violence, and to explore whether this potential coping mechanism evolves over time.

There are three main take-aways from this study. First, the attainment of the legal drinking age by husbands significantly increases their wives' probability of being abused. Second, a rise in the prevalence of intimate partner violence in the short term does not lead to a shift in the victims' attitudes toward violence. Instead, the duration of abuse is a key factor. Third, evidence indicates the long-term exposure to violence shift women's attitudes towards violence. This suggests that over time victims may normalise and rationalise the violence inflicted to them as a coping mechanism, if they do not have an outside option.

The paper identifies several potential avenues for future research. First, this study suggests that in contexts where outside options like divorce are stigmatised, tolerance of violence might act as coping mechanism for intimatenpartner violence victims. However, examining this relationship in settings where divorce, for instance, is less stigmatised remains an unexplored area, that deserves further investigation. Second, this paper highlights two potential main mechanisms behind women's tolerance of violence: the coping mechanism, and the risk factor (i.e., women with prior higher tolerance of violence tend to select into abusive relationships). An exploration of the interplay of the two mechanisms and their quantification can further advance our understanding of the attitude formation.

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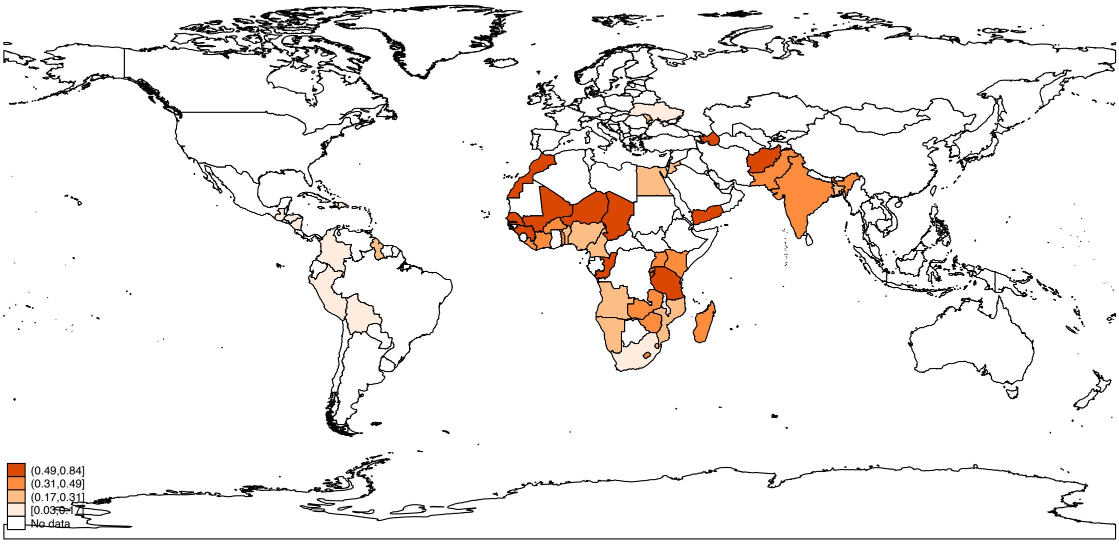
A Appendix

A.1 Descriptive Statistics

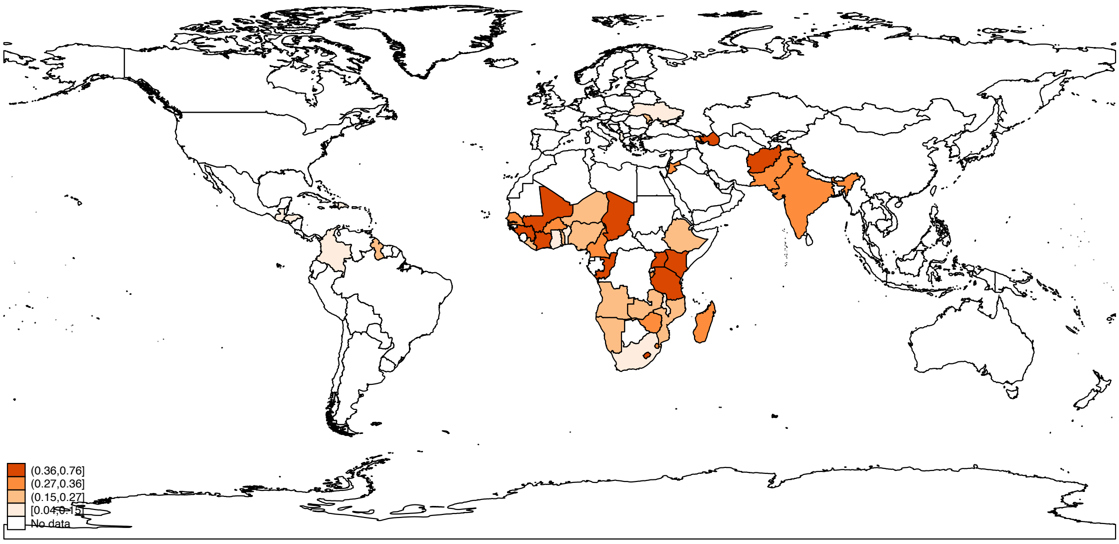
A.1.1 Women's and Men's tolerance of wife-beating across the world

Figure A.1: Women's Tolerance



Note: The map shows the country average women's tolerance towards violence f the wife: i) goes out without permission, ii) neglects the children, iii) argues with the husband, iv) burns food, v) refuses sexual intercourse. *Source:* Demographic and Health Survey (DHS - last survey rounds).

Figure A.2: Men's Tolerance



Note: The map shows the country average men's tolerance towards violence f the wife: i) goes out without permission, ii) neglects the children, iii) argues with the husband, iv) burns food, v) refuses sexual intercourse. *Source:* Demographic and Health Survey (DHS - last survey rounds).

Table A.1: Women's tolerance towards wife-beating in 5 scenarios

Country Round	Goes out w/out permission	Neglects the Children	Argues with the husband	Burns food	Refuses sex	Indicator
Afghanistan 2015	0.72	0.53	0.64	0.20	0.38	0.84
Albania 2017-2018	0.04	0.05	0.02	0.01	0.01	0.07
Angola 2015	0.15	0.17	0.16	0.11	0.12	0.25
Armenia 2015-2016	0.05	0.09	0.06	0.01	0.00	0.11
Azerbajan	0.46	0.37	0.34	0.16	0.13	0.53
Bangladesh 2014	0.14	0.15	0.20	0.04	0.07	0.28
Benin 2017-18	0.21	0.23	0.21	0.14	0.13	0.31
Bolivia 2008	0.06	0.12	0.05	0.02	0.03	0.16
Burkina faso 2010	0.30	0.30	0.31	0.10	0.20	0.43
Burundi 2016	0.39	0.52	0.30	0.22	0.42	0.59
Cameroon 2018	0.16	0.23	0.15	0.09	0.11	0.28
Chad 2014	0.62	0.63	0.53	0.51	0.44	0.75
Colombia 2015-2016	0.01	0.02	0.01	0.01	0.01	0.03
Congo democratic republic 2013-14	0.50	0.53	0.59	0.25	0.46	0.73
Cote d'ivoire 2011	0.27	0.33	0.35	0.17	0.22	0.47
Dominican republic 2013	0.01	0.02	0.01	0.00	0.01	0.02
Egypt 2014	0.26	0.24	0.13	0.07	0.20	0.32
Eswatini 2006	0.09	0.11	0.17	0.03	0.03	0.23
Guatemala 2014-2015	0.04	0.08	0.03	0.02	0.04	0.10
Guinea 2018	0.55	0.54	0.51	0.24	0.50	0.66
Guyane 2009	0.06	0.12	0.07	0.05	0.04	0.17
Haiti 2016-2017	0.11	0.10	0.02	0.05	0.04	0.16
Honduras 2011-2012	0.04	0.10	0.05	0.02	0.04	0.12
India 2019-2021	0.19	0.28	0.22	0.11	0.14	0.37
Jordan 2017-18	0.07	0.07	0.06	0.02		0.14
Kenya 2014	0.22	0.34	0.21	0.07	0.15	0.41
Lesotho 2014	0.11	0.22	0.25	0.06	0.10	0.33
Liberia 2013	0.29	0.32	0.33	0.07	0.11	0.42
Madagascar 2008	0.20	0.29	0.06	0.07	0.09	0.32
Malawi 2016	0.07	0.09	0.07	0.06	0.08	0.15
Mali 2018	0.54	0.52	0.69	0.23	0.64	0.77
Moldova 2004	0.07	0.19	0.05	0.03	0.04	0.22
Morocco 2003	0.50	0.50	0.51	0.24	0.45	0.62
Mozambique 2011	0.09	0.08	0.13	0.06	0.06	0.21
Namibia 2013	0.13	0.20	0.12	0.10	0.08	0.29
Nicaragua 2001	0.08	0.13	0.06	0.04	0.06	0.16
Niger 2012	0.44	0.43	0.51	0.35	0.52	0.58
Nigeria 2018	0.21	0.22	0.20	0.15	0.20	0.27
Pakistan 2017-18	0.32	0.28	0.32	0.19	0.28	0.41
Peru 2012	0.01	0.02	0.01	0.01	0.01	0.03
Rwanda 2014	0.22	0.30	0.21	0.09	0.25	0.36
Senegal 2017	0.33	0.36	0.36	0.22	0.36	0.44
South africa 2016	0.02	0.04	0.02	0.01	0.01	0.05
Tanzania 2015	0.42	0.49	0.43	0.20	0.32	0.58
Togo 2013	0.18	0.19	0.20	0.11	0.10	0.29
Uganda 2016	0.30	0.39	0.26	0.14	0.18	0.48
Ukraine 2009	0.00	0.03	0.01	0.01	0.00	0.04
Yemen 2013	0.36	0.31	0.20	0.34	0.10	0.50
Zambia 2018	0.27	0.32	0.33	0.22	0.31	0.44
Zimbabwe 2015	0.23	0.22	0.17	0.08	0.15	0.37
Average	0.22	0.25	0.22	0.12	0.17	0.34

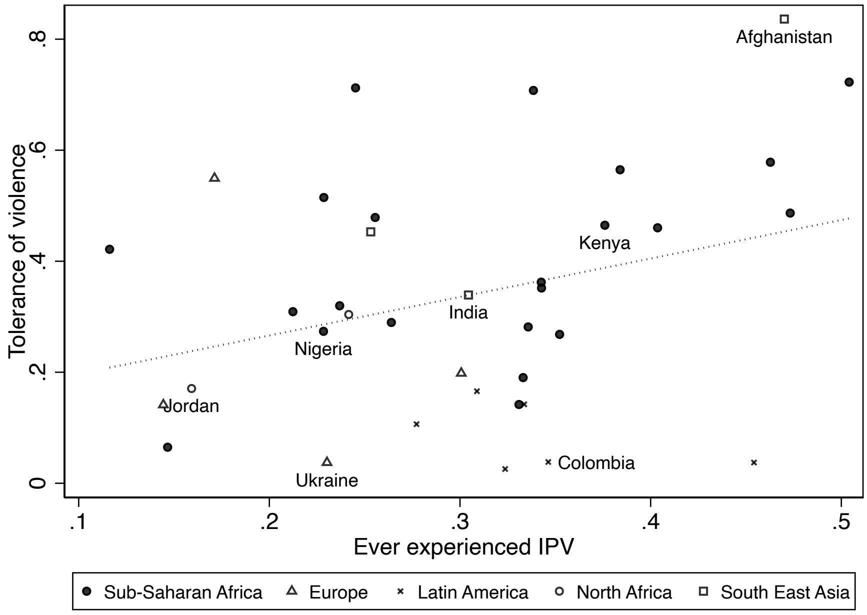
Notes: Table A.1 shows the average tolerance of wife-beating at country level. The first column in the table refers to the country round used. Subsequent columns show the country's average women's tolerance towards wife-beating in various scenarios involving. Specifically if the wife: i) goes out without permission, ii) neglects the children, iii) argues with the husband, iv) burns food, v) refuses sexual intercourse. The application of sample weights ensures representativeness. *Source:* Demographic and Health Survey (DHS - last survey rounds).

Table A.2: Men's tolerance towards wife-beating in 5 scenarios

Country Round	Goes out w/out permission	Neglects the Children	Argues with the husband	Burns food	Refuses sex	Indicator
Afghanistan 2015	0.63	0.28	0.48	0.09	0.21	0.74
Albania 2017-2018	0.07	0.08	0.04	0.01	0.02	0.12
Angola 2015	0.08	0.12	0.11	0.06	0.06	0.19
Armenia 2015-2016	0.12	0.18	0.17	0.01	0.02	0.24
Azerbajan	0.42	0.38	0.57	0.07	0.12	0.64
Benin 2017-18	0.09	0.09	0.10	0.07	0.07	0.14
Burkina faso 2010	0.17	0.19	0.20	0.07	0.11	0.32
Burundi 2016	0.17	0.25	0.10	0.05	0.13	0.32
Cameroon 2018	0.15	0.23	0.14	0.06	0.08	0.28
Chad 2014	0.29	0.38	0.23	0.28	0.25	0.50
Colombia 2015-2016	0.02	0.03	0.02	0.01	0.01	0.04
Congo democratic republic 2013-14	0.33	0.39	0.42	0.15	0.24	0.58
Cote d'ivoire 2011	0.22	0.28	0.25	0.12	0.12	0.41
Dominican republic 2013	0.02	0.02	0.01	0.01	0.01	0.04
Eswatini 2006	0.15	0.15	0.23	0.04	0.04	0.31
Ethiopia 2016	0.17	0.19	0.16	0.12	0.13	0.27
Ghana 2014	0.07	0.08	0.06	0.03	0.05	0.12
Guatemala 2014-2015	0.02	0.04	0.02	0.01	0.01	0.07
Guinea 2018	0.38	0.43	0.33	0.17	0.26	0.53
Guyane 2009	0.07	0.14	0.08	0.04	0.04	0.20
Haiti 2016-2017	0.06	0.05	0.01	0.02	0.02	0.09
Honduras 2011-2012	0.03	0.07	0.04	0.03	0.02	0.09
India 2019-2021	0.15	0.22	0.20	0.10	0.10	0.33
Jordan 2017 2018	0.19	0.13	0.18	0.08		0.31
Kenya 2014	0.19	0.27	0.21	0.05	0.10	0.36
Lesotho 2014	0.16	0.26	0.25	0.06	0.09	0.38
Liberia 2013	0.14	0.15	0.18	0.03	0.04	0.24
Madagascar 2008	0.18	0.24	0.09	0.06	0.08	0.29
Malawi 2016	0.05	0.06	0.05	0.02	0.05	0.12
Mali 2018	0.22	0.25	0.38	0.11	0.24	0.45
Moldova 2004	0.10	0.19	0.08	0.03	0.04	0.23
Mozambique 2011	0.06	0.07	0.08	0.01	0.09	0.15
Namibia 2013	0.10	0.14	0.09	0.04	0.03	0.21
Niger 2012	0.15	0.15	0.19	0.09	0.14	0.25
Nigeria 2018	0.12	0.11	0.12	0.07	0.11	0.19
Pakistan 2017-18	0.28	0.19	0.20	0.04	0.09	0.37
Rwanda 2014	0.07	0.12	0.05	0.02	0.06	0.15
Senegal 2017	0.14	0.17	0.18	0.06	0.11	0.26
South africa 2016	0.04	0.06	0.04	0.02	0.01	0.09
Tanzania 2015	0.23	0.31	0.25	0.06	0.14	0.39
Togo 2013	0.10	0.12	0.10	0.06	0.05	0.17
Uganda 2016	0.22	0.28	0.23	0.07	0.12	0.39
Ukraine 2009	0.04	0.10	0.05	0.01	0.02	0.12
Zambia 2018	0.12	0.15	0.14	0.06	0.10	0.23
Zimbabwe 2015	0.18	0.18	0.14	0.06	0.06	0.31
Average	0.15	0.17	0.16	0.06	0.09	0.27

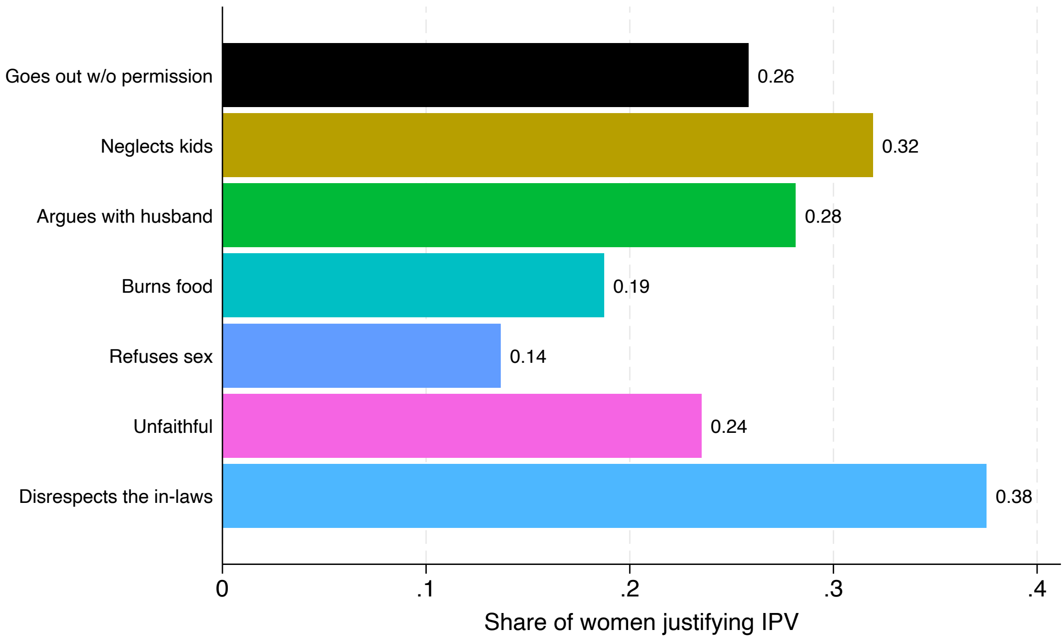
Notes: Table A.2 shows the average tolerance of wife-beating at country level. The first column in the table refers to the country round used. Subsequent columns show the country's average men's tolerance towards wife-beating in various scenarios involving. Specifically if the wife: i) goes out without permission, ii) neglects the children, iii) argues with the husband, iv) burns food, v) refuses sexual intercourse. The application of sample weights ensures representativeness. *Source:* Demographic and Health Survey (DHS - last survey rounds).

Figure A.3: Average tolerance of violence and prevalence of IPV



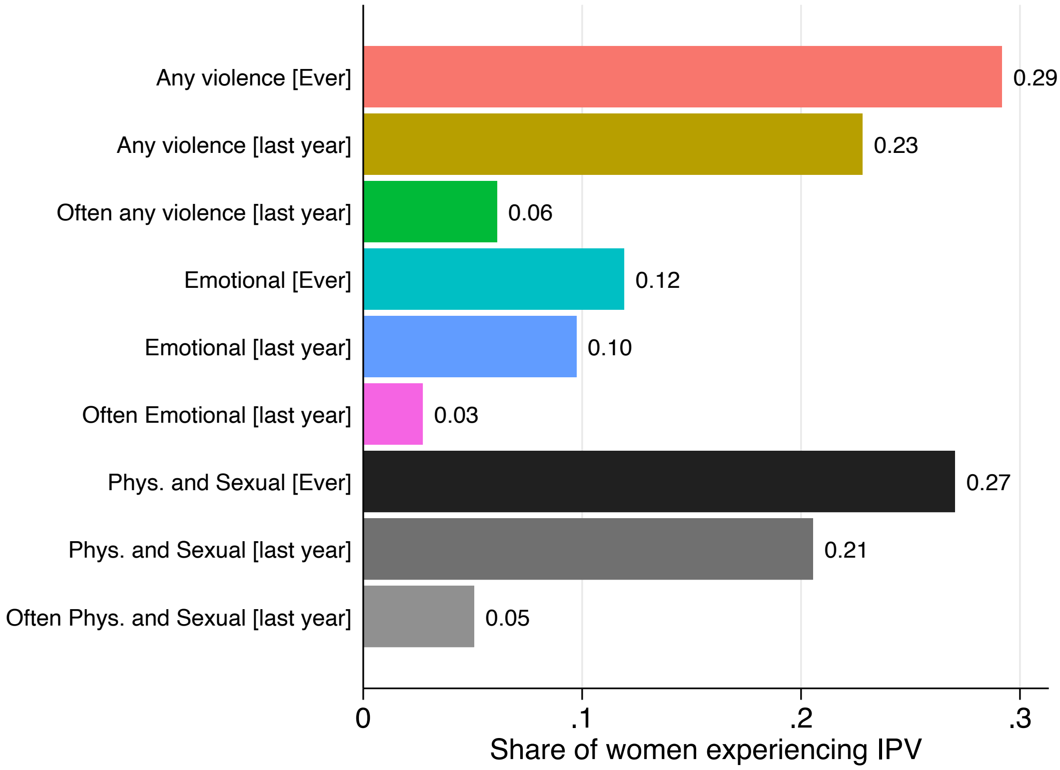
Note: The figure presents the positive correlation between the tolerance of IPV and experience of violence at country level. The y axis represents the country average women's tolerance of violence, and the x axis the country average experience of intimate partner violence during women's lifetime. The regression line (dotted line) has a slope of 0.693 and a standard error of 0.353. *Source:* Demographic and Health Survey (DHS - last survey rounds).

Figure A.4: Women's tolerance of violence



Note: The figure presents the share of women who justifies violence if she (i) argues with the husband, (ii) neglects kids, (iii) goes out without permission, (iv) burns food, (v) refuses sexual intercourse, (vi) is unfaithful and (vii) disrespects the in-laws. Sample restricted to couples residing in states where the MLDA is 21 and 25. *Source:* Own calculations using the National Family Health Survey (NFHS 2005-2015-2020).

Figure A.5: Prevalence of IPV in the last 12 months



Note: The figure presents the share of women who reported to have ever or in the last 12 months experienced emotional, physical, and sexual violence from their current partner, along with the frequency of the abuse. Sample restricted to couples residing in states where the MLDA is 21 and 25. *Source:* Own calculations using the National Family Health Survey (NFHS 2005-2015-2020).

A.1.2 Duration of Marriage and Abuse in states with MLDA at 21 and 25

This section provides some descriptive statistics of the sample used in the Event Study approach, as explained in Section 5.2.

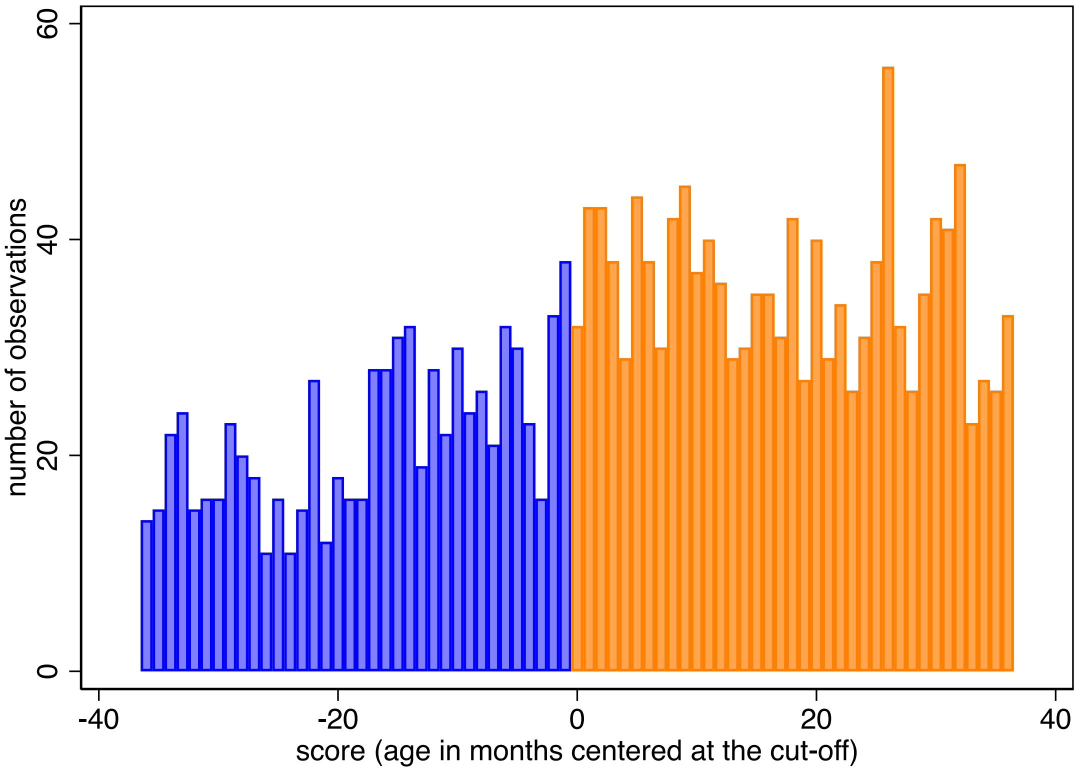
Table A.3: Descriptive Statistics Full Sample, MLDA 21, MLDA 25

	Panel A: Full Sample			
	Mean	SD	Min	Max
Age (men)	23.271	1.672	19.000	25.000
Age (women)	20.699	2.171	15.000	25.000
Age Marriage (men)	20.352	2.253	15.000	25.000
Age Marriage (women)	17.709	2.299	12.000	25.000
Duration Marriage	2.553	2.174	0.000	10.000
Duration Violence	0.611	1.400	0.000	9.000
Duration Violence (conditional on ever violence)	2.420	1.843	0.000	9.000
Interval to first birth (months)	20.834	12.437	0.000	108.000
	Panel B: MLDA 21			
Age (men)	23.236	1.694	19.000	25.000
Age (women)	20.669	2.151	15.000	25.000
Age Marriage (men)	20.249	2.237	15.000	25.000
Age Marriage (women)	17.606	2.248	12.000	25.000
Duration Marriage	2.618	2.176	0.000	10.000
Duration Violence	0.662	1.445	0.000	9.000
Duration Violence (conditional on ever violence)	2.438	1.832	0.000	9.000
Interval to first birth (months)	21.294	12.591	0.000	108.000
	Panel C: MLDA 25			
Age (men)	23.417	1.566	19.000	25.000
Age (women)	20.826	2.254	15.000	25.000
Age Marriage (men)	20.795	2.268	15.000	25.000
Age Marriage (women)	18.151	2.456	12.000	25.000
Duration Marriage	2.275	2.141	0.000	10.000
Duration Violence	0.392	1.172	0.000	9.000
Duration Violence (conditional on ever violence)	2.303	1.918	0.000	9.000
Interval to first birth (months)	18.769	11.502	0.000	102.000

Notes: Descriptive statistics (mean, standard deviation, min, and max) of the main variables of interest. Panel A includes the full sample, Panel B includes couples residing in states where the MLDA = 21, and Panel C includes couples residing in states where the MLDA = 25. *Source*: Own calculations using the National Family Health Survey (NFHS 2005-2015-2020).

A.2 Validity Assumptions

Figure A.6: Assumption 1: no manipulation in the treatment status



Note: The figure presents the distribution of the running variable. Bins are of size 1 in a 36 months bandwidth around the cutoff at 0 (that corresponds to husband's age in months centred around 25 years old and 0 month). *Source:* Own calculations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.4: Assumption 2: Balance of the pre-determined covariates – Full Sample

	Above MLDA	Left Bandwidth	Right Bandwidth	N
Low Caste (Men)	0.031	43	72	3,448
	(0.043)			
Low Caste (Women)	0.033	32	82	3,601
	(0.048)			
Childhood in rural areas (Men)	-0.022	41	69	2,297
	(0.068)			
Childhood in rural areas (Women)	-0.001	38	126	367
	(0.149)			
Hindu (Men)	-0.020	32	90	4,001
	(0.053)			
Hindu (Women)	-0.002	37	86	3,946
	(0.053)			
Year of Birth (Men)	0.005	38	150	6,575
	(0.044)			
Year of Birth (Women)	0.118	34	76	3,547
	(0.226)			
Age Gap	0.128	33	79	3,581
	(0.227)			
Education Gap	-0.342	37	92	4,156
	(0.416)			
Household Size	0.200	33	70	3,254
	(0.321)			
Daughters at home	0.089	42	62	3,014
	(0.075)			
Husband's unemployment	-0.020	34	124	5,463
	(0.018)			
Husband working away for work	-0.000	34	115	4,404
	(0.043)			
Husband earns cash	0.021	33	121	4,753
	(0.019)			
Abusive father (Men)	0.043	32	142	6,165
	(0.044)			
Abusive father (Women)	0.060	36	58	1,995
	(0.056)			
Wave 1	-0.000	5	27	1,090
	(0.000)			
Wave 2	0.000	11	20	1,061
	(0.000)			
Wave 3	0.000	7	29	1,266
	(0.000)			

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score. Robust corrected standard errors clustered at the running variable level in parentheses. All specifications year of the interview and state fixed effects.* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.
Source: Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.5: Assumption 2: Balance of the pre-determined covariates – Lower Caste Sample

	Above MLDA	Left Bandwidth	Right Bandwidth	N
Childhood in rural areas (Men)	-0.053	36	92	1,757
	(0.066)			
Childhood in rural areas (Women)	0.123	33	83	156
	(0.191)			
Hindu (Men)	-0.012	34	83	2,279
	(0.043)			
Hindu (Women)	0.005	37	95	2,634
	(0.046)			
Year of Birth (Men)	0.009	34	156	4,021
	(0.043)			
Year of Birth (Women)	0.302	29	79	2,147
	(0.407)			
Age Gap	0.296	28	81	2,186
	(0.416)			
Education Gap	-0.507	29	134	3,495
	(0.617)			
Household Size	0.519	38	135	3,663
	(0.369)			
Daughters at home	0.140	39	64	1,891
	(0.087)			
Husband's unemployment	-0.007	38	115	3,074
	(0.026)			
Husband working away for work	-0.017	35	107	2,612
	(0.048)			
Husband earns cash	0.018	40	125	3,087
	(0.029)			
Abusive father (Men)	.024	33	118	3,109
	(0.057)			
Abusive father (Women)	0.099	34	55	1,227
	(0.082)			
Wave 1	-0.000	11	28	806
	(0.000)			
Wave 2	0.000	8	26	697
	(0.000)			
Wave 3	0.000	18	33	1,040
	(0.000)			

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score, restricting the sample to Lower Caste individuals. Robust corrected standard errors clustered at the running variable level in parentheses. All specifications year of the interview and state fixed effects.* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.6: Assumption 2: Balance of the pre-determined covariates – Upper Caste Sample

	Above MLDA	Left Bandwidth	Right Bandwidth	N
Childhood in rural areas (Men)	0.001	36	75	862
	(0.145)			
Childhood in rural areas (Women)	-0.548	15	71	67
	(1.079)			
Hindu (Men)	-0.077*	33	118	1,885
	(0.084)			
Hindu (Women)	-0.054	36	109	1,795
	(0.090)			
Year of Birth (Men)	-0.011	34	134	2,253
	(0.058)			
Year of Birth (Women)	-0.187	38	86	1,467
	(0.489)			
Age Gap	-0.193	38	89	1,492
	(0.470)			
Education Gap	-0.016	31	93	1,542
	(0.381)			
Household Size	-0.000	33	68	1,194
	(0.378)			
Daughters at home	0.017	34	81	1,356
	(0.118)			
Husband unemployment	-0.030	34	116	1,862
	(0.037)			
Husband working away for work	0.015	32	125	1,692
	(0.064)			
Husband earns cash	0.029	33	123	1,765
	(0.038)			
Abusive father (Men)	0.064	33	120	1,935
	(0.054)			
Abusive father (Women)	0.017	28	93	1,132
	(0.062)			
Wave 1	0.000	15	37	621
	(0.000)			
Wave 2	0.000	30	23	537
	(0.000)			
Wave 3	0.000	28	34	658
	(0.000)			

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score, restricting the sample to Upper Caste individuals. Robust corrected standard errors clustered at the running variable level in parentheses. All specifications year of the interview and state fixed effects.* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.7: Frandsen Test to test for no Manipulation of the running variable- Low and Upper Caste Samples

Caste	Frandsen test	p-value
Low Caste	Fail to reject	0.473
Upper Caste	Fail to reject	0.887

Notes: Frandsen test for continuity of the running variable. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

A.3 Robustness Checks

Table A.8: Alternative definitions of alcohol consumption

	Reduced Form (ITT)	
	Alcohol consumption [as reported by men]	Alcohol consumption [as reported by women]
Above MLDA	0.102***	0.062
SE	(0.036)	(0.043)
Left BW	30	32
Right BW	95	130
N	4,224	4,617
Mean of control	0.254	0.159

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score. *Alcohol consumption as reported by the men* is a binary variable that takes value one when the male respondent is asked whether he consumes alcohol, *Alcohol consumption as reported by the women* is a binary variable that takes value one when the female respondent is asked whether her husband consumes alcohol. Robust corrected standard errors clustered at the running variable level in parentheses. All specifications include wave and state fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

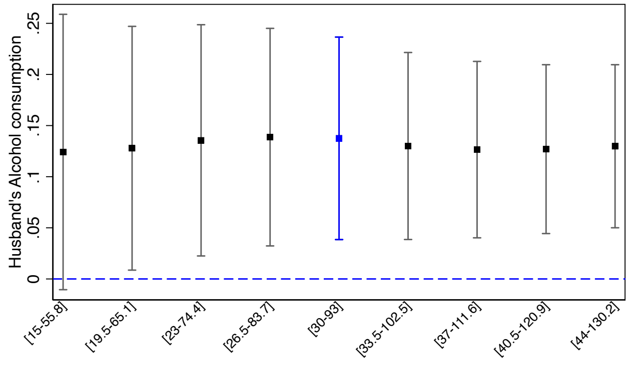
Table A.9: Alternative definitions of tolerance

	Tolerance [Indicator]
Above MLDA	0.015
SE	(0.087)
Left BW	37
Right BW	114
N	4945
Mean of control	0.46

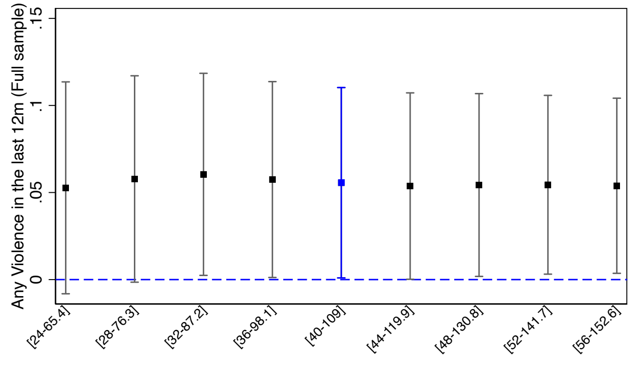
Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score. The outcome variable is a binary variable that takes value one if the respondents deem as acceptable at least one situation. Robust corrected standard errors clustered at the running variable level in parentheses. All specifications include wave and state fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$.
Source: Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Figure A.7: Bandwidth Sensitivity - Full Sample

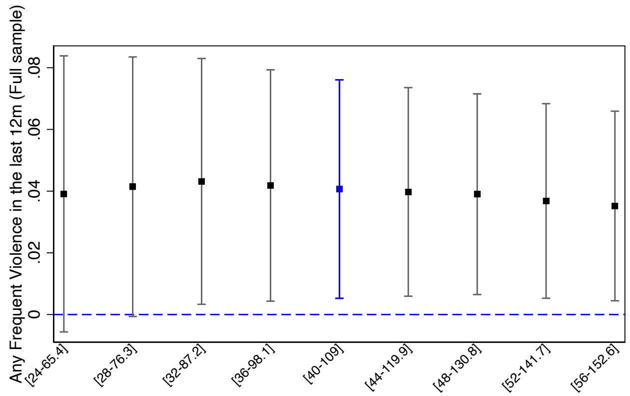
(a) Effect of MLDA on husband's alcohol consumption, with alternative bandwidths



(b) Effect of MLDA on prevalence of violence in the last 12 months, with alternative bandwidths



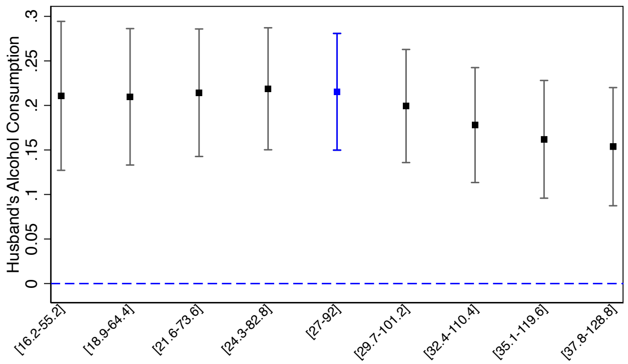
(c) Effect of MLDA on **frequent** prevalence of violence in the last 12 months, with alternative bandwidths



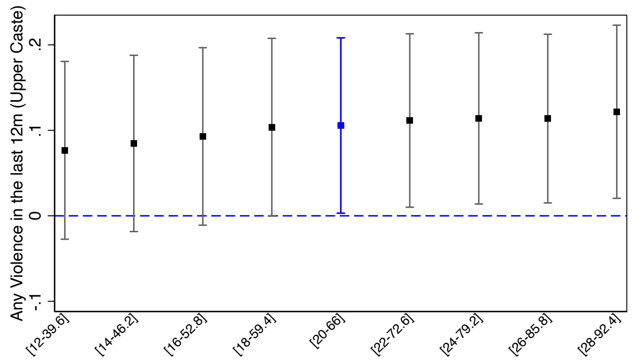
Note: Each point denotes the estimated β coefficient derived from a local nonparametric regression-discontinuity design. The x-axis bandwidth reflects the specification used. A triangular kernel with a linear polynomial of the score was utilized. The blue point estimate corresponds to the coefficient estimated using the optimal bandwidths as outlined by Calonico et al. (2014). The other coefficients were estimated by modifying these bandwidths: adding 10% (shifting towards the right of the graph) and subtracting 10% (shifting towards the left). Capped vertical bars indicate 90% confidence intervals, computed using bias-robust standard errors and clustered at the running variable level. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Figure A.8: Bandwidth Sensitivity - Upper Caste Sample

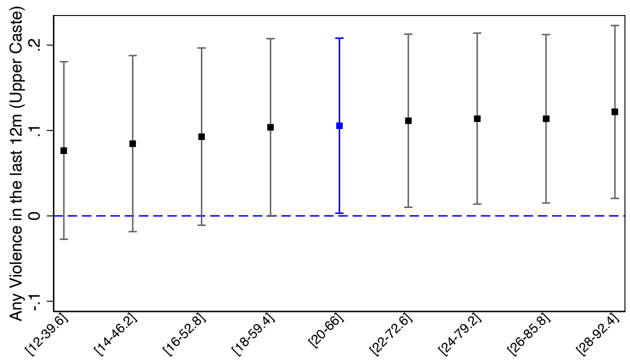
(a) Effect of MLDA on husband's alcohol consumption, with alternative bandwidths [Upper Caste]



(b) Effect of MLDA on prevalence of violence in the last 12 months, with alternative bandwidths [Upper Caste]



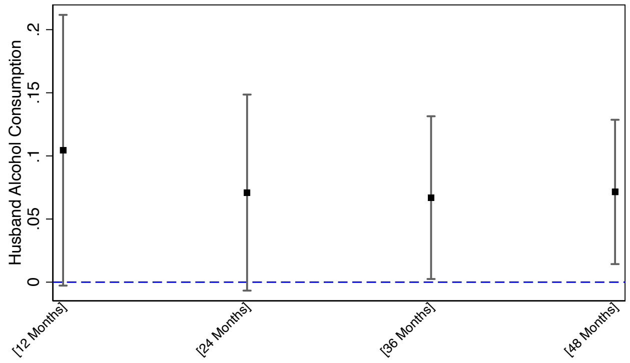
(c) Effect of MLDA on **frequent** prevalence of violence in the last 12 months, with alternative bandwidths [Upper Caste]



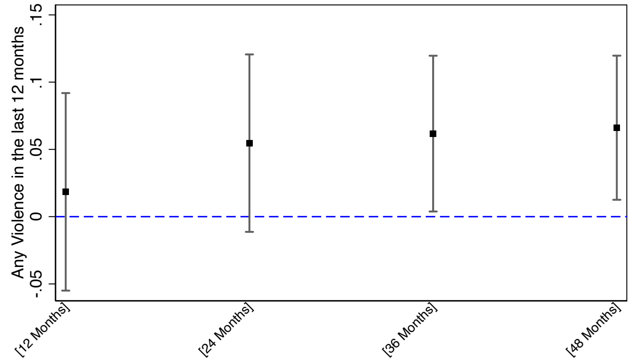
Note: Each point denotes the estimated β coefficient derived from a local nonparametric regression-discontinuity design, restricting the sample to couples belonging to the **Upper Caste**. The x-axis bandwidth reflects the specification used. A triangular kernel with a linear polynomial of the score was utilised. The blue point estimate corresponds to the coefficient estimated using the optimal bandwidths as outlined by Calonico et al. (2014). The other coefficients were estimated by modifying these bandwidths: adding 10% (shifting towards the right of the graph) and subtracting 10% (shifting towards the left). Capped vertical bars indicate 90% confidence intervals, computed using bias-robust standard errors and clustered at the running variable level. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Figure A.9: Bandwidth Sensitivity: 12-24-36-48 months

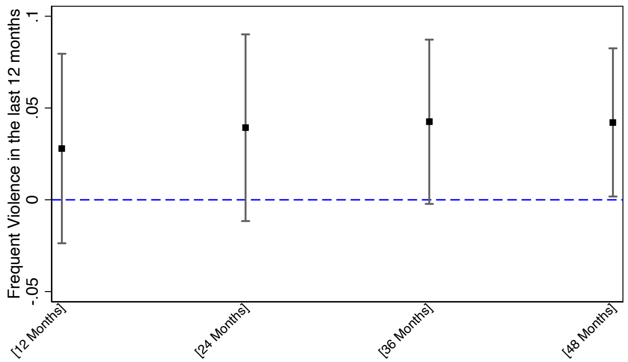
(a) Effect of MLDA on husband's alcohol consumption, with alternative bandwidths [Full Sample]



(b) Effect of MLDA on prevalence of violence in the last 12 months, with alternative bandwidths [Full Sample]



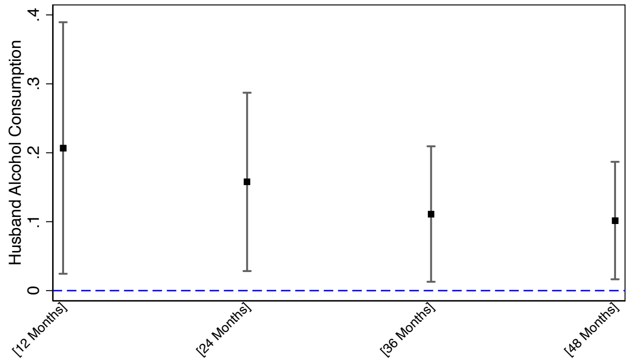
(c) Effect of MLDA on **frequent** prevalence of violence in the last 12 months, with alternative bandwidths [Full Sample]



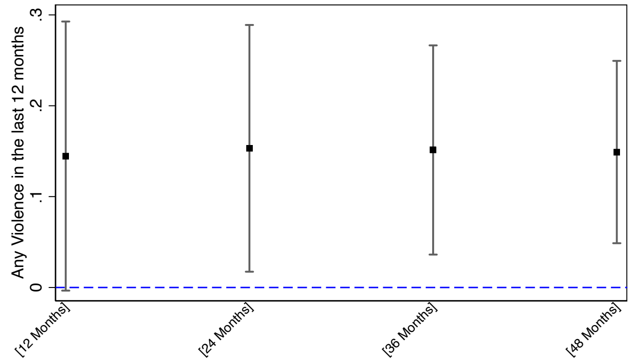
Note: Each point denotes the estimated β coefficient derived from a local nonparametric regression-discontinuity design. The x-axis bandwidth reflects the specification used. A triangular kernel with a linear polynomial of the score was utilised. The blue point estimate corresponds to the coefficient estimated using the optimal bandwidths as outlined by Calonico et al. (2014). The other coefficients were estimated by modifying these bandwidths: adding 10% (shifting towards the right of the graph) and subtracting 10% (shifting towards the left). Capped vertical bars indicate 90% confidence intervals, computed using bias-robust standard errors and clustered at the running variable level. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Figure A.10: Bandwidth Sensitivity: 12-24-36-48 months [Upper Caste]

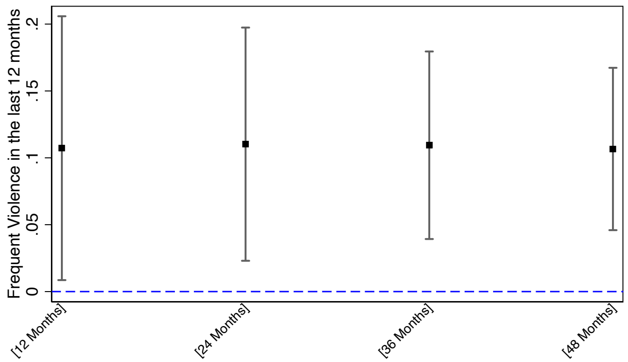
(a) Effect of MLDA on husband's alcohol consumption, with alternative bandwidths [Upper Caste]



(b) Effect of MLDA on prevalence of violence in the last 12 months, with alternative bandwidths [Upper Caste]



(c) Effect of MLDA on **frequent** prevalence of violence in the last 12 months, with alternative bandwidths [Upper Caste]



Note: Each point denotes the estimated β coefficient derived from a local nonparametric regression-discontinuity design. The x-axis bandwidth reflects the specification used. A triangular kernel with a linear polynomial of the score was utilised. The blue point estimate corresponds to the coefficient estimated using the optimal bandwidths as outlined by Calonico et al. (2014). The other coefficients were estimated by modifying these bandwidths: adding 10% (shifting towards the right of the graph) and subtracting 10% (shifting towards the left). Capped vertical bars indicate 90% confidence intervals, computed using bias-robust standard errors and clustered at the running variable level. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.10: Quadratic – Full sample

	Husband drinks	Any violence	Any violence [often]	Attitude
T	0.129**	0.053	0.050**	0.034
SE	0.052	0.042	0.025	0.077
P-Value	0.010	0.313	0.040	0.914
Left BW	47	35	37	37
Right BW	153	87	106	157
N	6,724	3,040	3,720	6,714
Mean of control	0.298	0.171	0.052	0.304

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a quadratic polynomial of the score. Robust corrected standard errors clustered at the running variable level in parentheses. All specifications include wave and state fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.11: Quadratic – Lower Caste

	Husband drinks	Any violence	Any violence [often]	Attitude
T	0.079	0.030	0.029	0.013
SE	0.070	0.052	0.031	0.103
P-Value	0.340	0.526	0.289	0.710
Left BW	39	37	41	27
Right BW	163	89	109	179
N	4,221	1,931	2,381	4,340
Mean of control	0.322	0.190	0.055	0.296

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a quadratic polynomial of the score, restricting the sample to the lower caste. Robust corrected standard errors clustered at the running variable level in parentheses. All specifications include wave and state fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.12: Quadratic – Upper Caste

	Husband drinks	Any violence	Any violence [often]	Attitude
T	0.232***	0.102	0.097***	-0.073
SE	0.079	0.057	0.036	0.076
P-Value	0.001	0.200	0.005	0.331
Left BW	47	33	32	49
Right BW	126	109	105	138
N	2,135	1,362	1,317	2,332
Mean of control	0.260	0.140	0.048	0.322

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a quadratic polynomial of the score, restricting the sample to the upper caste. Robust corrected standard errors clustered at the running variable level in parentheses. All specifications include wave and state fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.13: Exclude Delhi

	Husband drinks	Any	Phys and Sex	Emotional	Attitude Index
T	0.127***	0.086**	0.052	0.066***	0.074
SE	0.040	0.043	0.042	0.023	0.098
P-Value	0.000	0.034	0.266	0.001	0.266
Left BW	28	38	39	32	34
Right BW	88	79	88	77	118
N	3,535	2,515	2,809	2,449	4,676
Mean of control	0.245	0.172	0.145	0.078	-0.028

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score, excluding couples residing in Delhi. Robust corrected standard errors clustered at the running variable level in parentheses. All specifications include wave and state fixed effects. * p < 0.1; ** p <0.05; *** p <0.01. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.14: Intensity - Exclude Delhi

	Often Any	Often Phys and Sex	Often Emotional
T	0.056***	0.039*	0.032***
SE	0.026	0.023	0.015
P-Value	0.009	0.082	0.004
Left BW	34	36	33
Right BW	70	98	66
N	2,282	3,162	2,069
Mean of control	0.051	0.040	0.021

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score, excluding couples residing in Delhi. Robust corrected standard errors clustered at the running variable level in parentheses. All specifications include wave and state fixed effects. * p < 0.1; ** p <0.05; *** p <0.01. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.15: Exclude couples with past familial abuse – Full Sample

	Husband drinks	Any violence	Any violence [often]	Attitude Index
T	0.176***	0.092**	0.031*	0.178
SE	0.062	0.040	0.015	0.185
P-Value	0.001	0.014	0.089	0.284
Left BW	30	32	31	29
Right BW	132	79	90	104
N	2,903	1,687	1,932	2,214
Mean of control	0.209	0.110	0.027	-0.054

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score, excluding couples with past familial abuse. Robust corrected standard errors clustered at the running variable level in parentheses. All specifications include wave and state fixed effects. * p < 0.1; ** p <0.05; *** p <0.01. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.16: Exclude couples with past familial abuse – Lower Caste

	Husband drinks	Any violence	Any violence [often]	Attitude Index
T	0.126	0.045	0.012	0.187
SE	0.093	0.054	0.013	0.192
P-Value	0.111	0.479	0.733	0.249
Left BW	36	35	29	29
Right BW	101	74	54	83
N	1,307	953	687	1,008
Mean of control	0.217	0.106	0.021	-0.095

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score, excluding couples with past familial abuse. Sample restricted to the upper caste. Robust corrected standard errors clustered at the running variable level in parentheses. All specifications include wave and state fixed effects. * p < 0.1; ** p <0.05; *** p <0.01. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.17: Exclude couples with past familial abuse – Upper Caste

	Husband drinks	Any violence	Any violence [often]	Attitude Index
T	0.276***	0.151***	0.038*	0.143
SE	0.072	0.059	0.026	0.249
P-Value	0.000	0.001	0.080	0.562
Left BW	25	36	32	33
Right BW	99	73	75	123
N	804	631	640	1,055
Mean of control	0.201	0.119	0.037	0.022

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score, excluding couples with past familial abuse. Sample restricted to the lower caste. Robust corrected standard errors clustered at the running variable level in parentheses. All specifications include wave and state fixed effects. * p < 0.1; ** p <0.05; *** p <0.01. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.18: Include Convariates – all sample

	Husband drinks	Any violence	Any violence [often]	Attitude
T	0.129***	0.056	0.042**	0.025
SE	0.042	0.034	0.022	0.061
P-Value	0.001	0.131	0.031	0.478
Left BW	32	40	35	34
Right BW	107	109	74	129
N	4,688	3,857	2,637	5,658
Mean of control	0.298	0.171	0.052	0.304

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score. Robust corrected standard errors clustered at the running variable level in parentheses. All specifications include wave and state fixed effects. Covariates added: religion, caste, education gap, age gap. * p < 0.1; ** p <0.05; *** p <0.01. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.19: Include Convariates – Lower Caste

	Husband drinks	Any violence	Any violence [often]	Attitude
T	0.078	0.021	0.016	0.097
SE	0.055	0.039	0.027	0.077
P-Value	0.156	0.767	0.511	0.117
Left BW	40	39	38	33
Right BW	83	107	114	104
N	2,340	2,334	2,466	2,776
Mean of control	0.322	0.190	0.055	0.296

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score. Robust corrected standard errors clustered at the running variable level in parentheses. All specifications include wave and state fixed effects. Sample restricted to the lower caste. Covariates added: religion, caste, education gap, age gap. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.20: Include Convariates – Upper Caste

	Husband drinks	Any violence	Any violence [often]	Attitude
T	0.236***	0.109	0.096***	-0.051
SE	0.062	0.050	0.033	0.072
P-Value	0.000	0.115	0.001	0.472
Left BW	29	20	29	48
Right BW	87	66	64	70
N	1,425	769	784	1,243
Mean of control	0.260	0.140	0.048	0.322

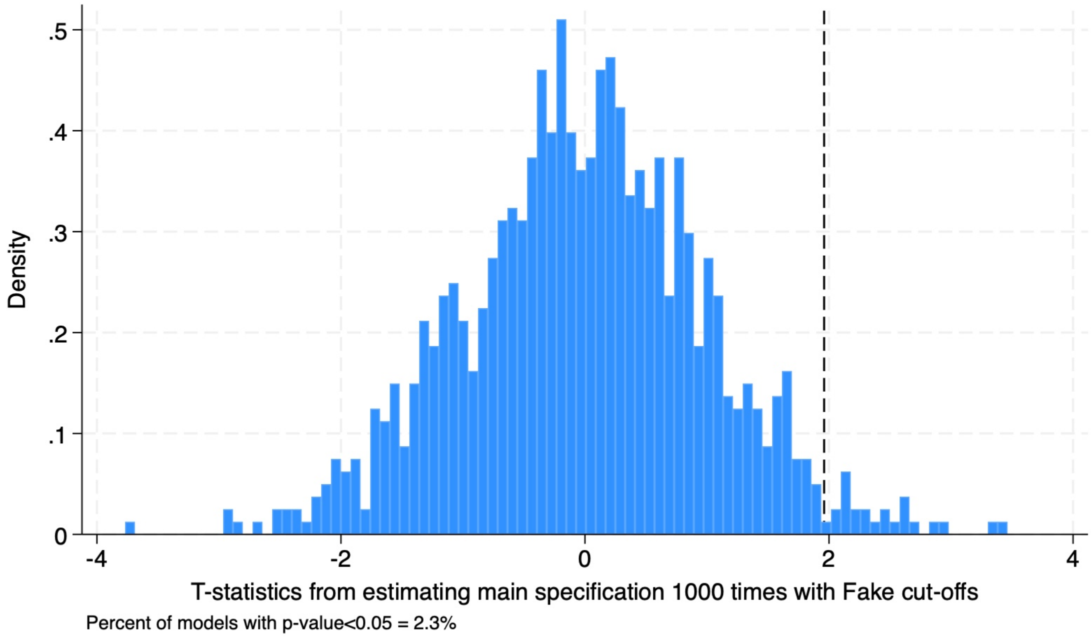
Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score. Robust corrected standard errors clustered at the running variable level in parentheses. All specifications include wave and state fixed effects. Sample restricted to the Upper Caste. Covariates added: religion, caste, education gap, age gap. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.21: States with ban on alcohol

	Husband drinks	Any violence	Any violence [often]	Attitude
T	-0.018	0.006	0.014	0.004
SE	0.050	0.059	0.028	0.038
P-Value	0.959	0.715	0.456	0.457
Left BW	29	42	38	29
Right BW	97	134	108	138
N	4,063	4,843	3,621	5,915
Mean of control	0.190	0.229	0.038	0.410

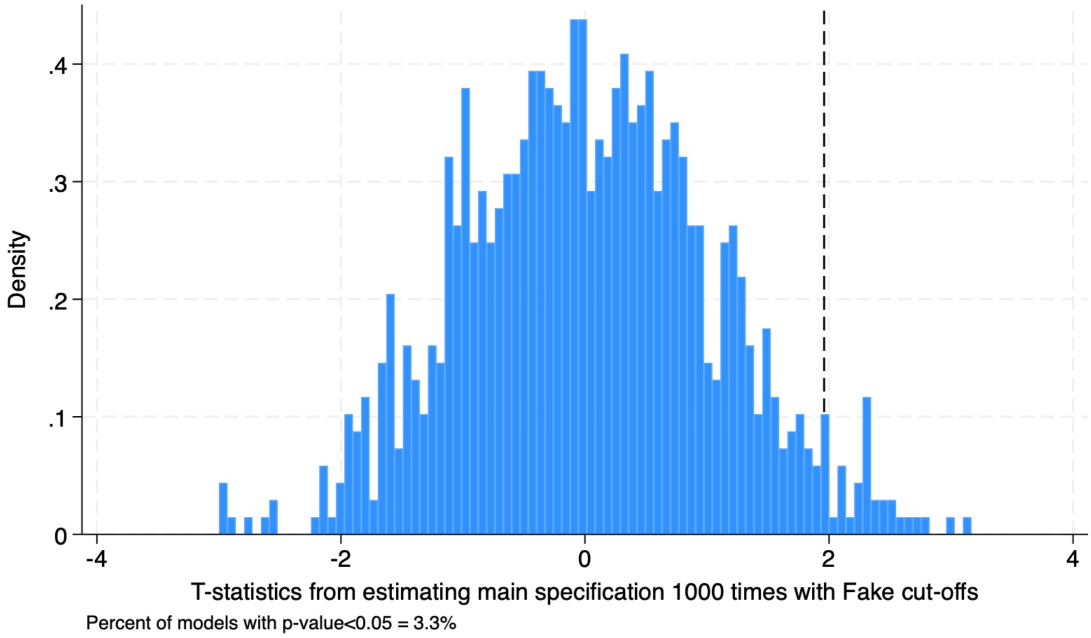
Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score. Robust corrected standard errors clustered at the running variable level in parentheses. All specifications include wave and state fixed effects. Sample restricting to couples living in states with a ban on alcohol. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Figure A.11: T-statistics distribution - Outcome: Husband's alcohol consumption



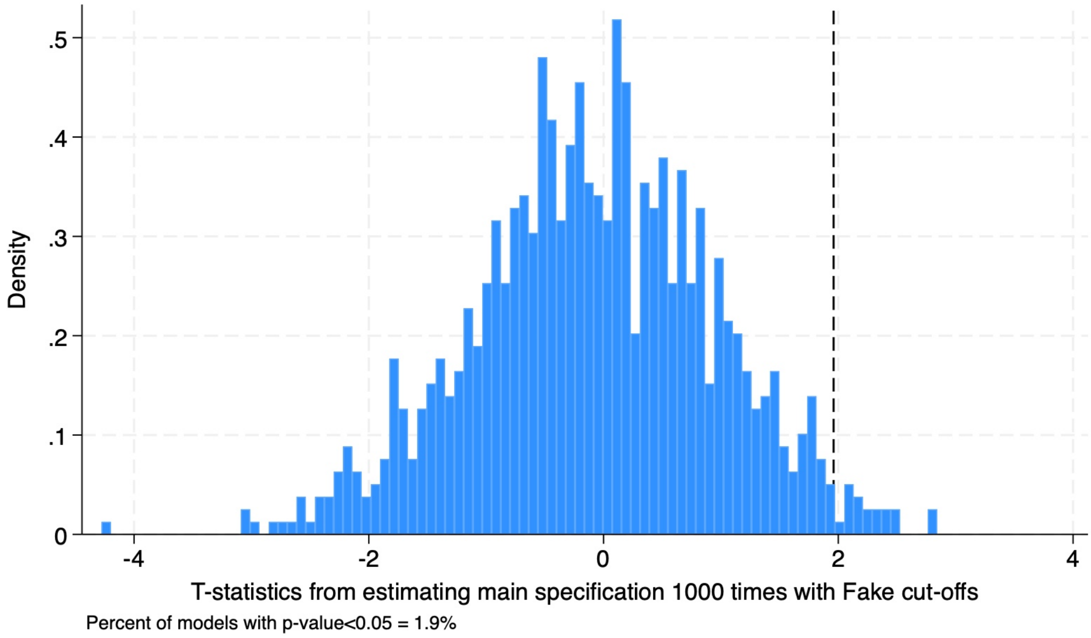
Note: The figure displays the t-statistics distribution from 1000 regressions of the specification 1, where I construct fake hypothetical cut-offs, obtained using a random number generator. This approach follows Young (2019). The outcome variable is husband's alcohol consumption. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Figure A.12: T-statistics distribution - Outcome: Occurrence of violence in the last 12 months



Note: The figure displays the t-statistics distribution from 1000 regressions of the specification 1, where I construct fake hypothetical cut-offs, obtained using a random number generator. This approach follows Young (2019). The outcome variable is the prevalence of violence in the past year. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Figure A.13: T-statistics distribution - Outcome: Frequent Occurrence of violence in the last 12 months



Note: The figure displays the t-statistics distribution from 1000 regressions of the specification 1, where I construct fake hypothetical cut-offs, obtained using a random number generator. This approach follows Young (2019). The outcome variable is frequent prevalence of violence in the past year. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.22: Full sample Kolesar SE

	Husband drinks	Any violence	Any violence [often]	Attitude
T	0.121***	0.054	0.042*	0.028
SE	0.045	0.047	0.026	0.044
P-Value	0.004	0.302	0.070	0.276
Left BW	33	39	36	35
Right BW	103	113	73	138
N	4,587	3,915	2,611	6,011
Mean of control	0.298	0.171	0.052	0.304

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score. Robust corrected standard errors, as recommended by Kolesár and Rothe (2018). All specifications include wave and state fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.23: LC sample Kolesar SE

	Husband drinks	Any violence	Any violence [often]	Attitude
T	0.077	0.017	0.017	0.088**
SE	0.058	0.064	0.034	0.054
P-Value	0.184	0.943	0.578	0.043
Left BW	41	38	37	33
Right BW	75	110	111	92
N	2,184	2,392	2,409	2,502
Mean of control	0.322	0.190	0.055	0.296

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score, restricting the sample to the lower caste. Robust corrected standard errors, as recommended by Kolesár and Rothe (2018). All specifications include wave and state fixed effects. * p < 0.1; ** p <0.05; *** p <0.01. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.24: LC sample Kolesar SE

	Husband drinks	Any violence	Any violence [often]	Attitude
T	0.209***	0.112	0.096***	-0.067
SE	0.066	0.094	0.033	0.077
P-Value	0.000	0.354	0.001	0.390
Left BW	30	20	33	43
Right BW	91	71	69	84
N	1,504	852	872	1,416
Mean of control	0.260	0.140	0.048	0.322

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score, restricting the sample to the upper caste. Robust corrected standard errors, as recommended by Kolesár and Rothe (2018). All specifications include wave and state fixed effects. * p < 0.1; ** p <0.05; *** p <0.01. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.25: Standard Errors Clustered at the district level – Full Sample

	Husband drinks	Any violence	Any violence [often]	Attitude
T	0.122***	0.090*	0.044	0.016
SE	0.045	0.050	0.027	0.047
P-Value	0.004	0.070	0.203	0.559
Left BW	39	37	30	34
Right BW	100	109	115	144
N	3,104	2,602	2,665	4,253
Mean of control	0.298	0.171	0.052	0.304

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score. Robust corrected standard errors, clustered at the district level. All specifications include wave and state fixed effects. * p < 0.1; ** p <0.05; *** p <0.01. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Table A.26: Standard Errors Clustered at the district level – Lower Caste

	Husband drinks	Any violence	Any violence [often]	Attitude
T	0.088	0.046	0.043	0.024
SE	0.060	0.071	0.038	0.055
P-Value	0.132	0.635	0.433	0.458
Left BW	40	41	30	35
Right BW	81	94	107	85
N	1,657	1,537	1,676	1,717
Mean of control	0.322	0.190	0.055	0.296

Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score, restricting the sample to the lower caste. Robust corrected standard errors, clustered at the district level. All specifications include wave and state fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

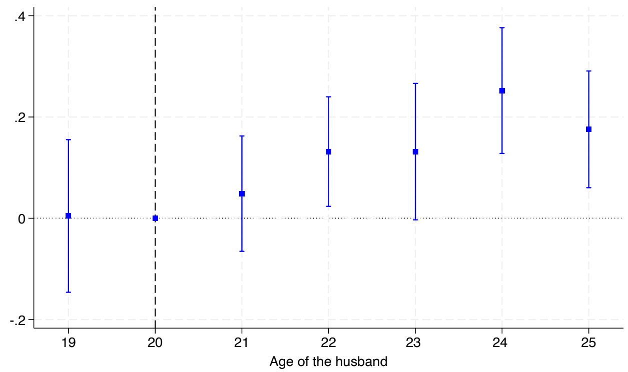
Table A.27: Standard Errors Clustered at the district level – Upper Caste

	Husband drinks	Any violence	Any violence [often]	Attitude
T	0.212***	0.232***	0.096***	-0.014
SE	0.071	0.065	0.035	0.101
P-Value	0.001	0.000	0.006	0.781
Left BW	30	34	33	36
Right BW	106	75	66	79
N	1,010	573	488	796
Mean of control	0.260	0.140	0.048	0.322

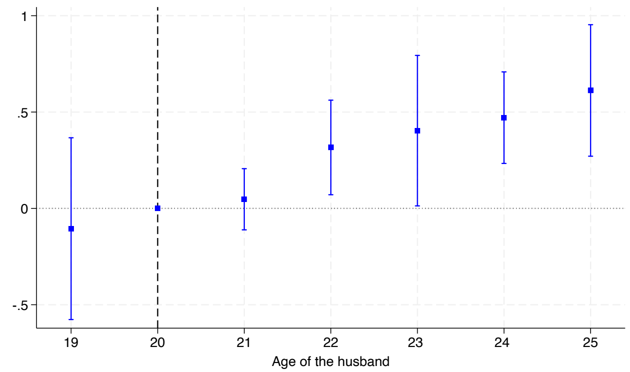
Notes: Local non-parametric regression-discontinuity design specification in the Calonico et al. (2014) optimal bandwidth, with a triangular kernel and a linear polynomial of the score, restricting the sample to the upper caste. Robust corrected standard errors, clustered at the district level. All specifications include wave and state fixed effects. * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

Figure A.14: Long-term effects – Sample restricted to couples whose husband married before 21

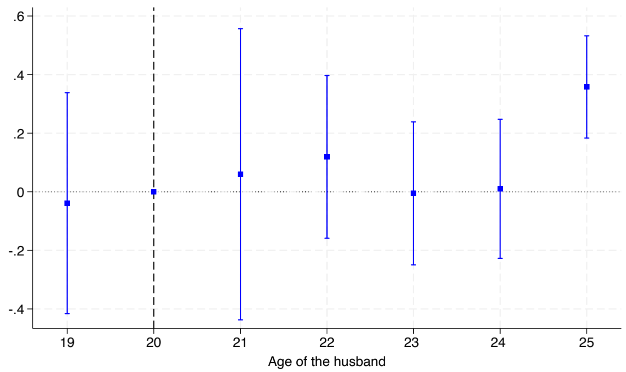
(a) Husband's alcohol cosumption



(b) Duration of abuse (years)



(c) Women's attitudes towards wife-beating



Note: Figure **??** reports the coefficient of the β from equation 2. The y-axis reports the estimated coefficient of the interaction between the age of the partner in states where the MLDA is 21 vs MLDA at 25. The x-axis represents the age of the husband at the time of the interview relative to 21 years old, and consequently the years in which the husband was legally allowed to drink. Omitted category: individuals aged 20 at the time of the interview. The capped vertical bars show 90% confidence intervals calculated using robust standard errors clustered at the at the state and age at the interview level. Sample restricted to couples whose husband married before the age 21. *Source:* Own estimations using the National Family Health Survey (NFHS 2005-2015-2020).

B Theoretical Appendix

This section shows the iterative method to derive the posterior probability under standard Bayesian updating, as discussed in Section 2.

Let's assume that a woman at time $t = 0$ holds a certain prior about her husband being a violent-type P_0.

- At time $t = 1$, the woman receives a violent signal θ. Thus her posterior at time $t = 1$ will take the following form:

$$P_1(\theta) = \frac{P_0 P_\theta}{P_0 P_\theta + (1-P_0)(1-P_\theta)}$$

  That can be rewritten as:

$$P_1(\theta) = \frac{1}{1+(\frac{1-P_0}{P_0})(\frac{1-P_\theta}{P_\theta})}$$

- At time $t = 2$, the woman receives a second violent signal θ. Thus her posterior at time $t = 2$ will take the following form:

$$P_2(\theta^2) = \frac{P_1(\theta) P_\theta}{P_1(\theta) P_\theta + (1-P_1(\theta))(1-P_\theta)}$$

  That can be rewritten as:

$$P_2(\theta^2) = \frac{1}{1+(\frac{1-P_1(\theta)}{P_1(\theta)})(\frac{1-P_\theta}{P_\theta})}$$

  Knowing from the equations above that $\frac{1-P_1(\theta)}{P_1(\theta)} = (\frac{1-P_0}{P_0})(\frac{1-P_\theta}{P_\theta})$, $P_2(\theta^2)$ can be rewritten as follow:

$$P_2(\theta^2) = \frac{1}{1+(\frac{1-P_0}{P_0})(\frac{1-P_\theta}{P_\theta})^2}$$

- At time $t = 3$, the woman receives a non-violent signal $n\theta$. In the three periods from $t = 1$ to $t = 3$, she has therefore received two violent signals (θ) and one non-violent signal (nθ). Thus her posterior at time $t = 3$ will take the following form:

$$P_3(\theta^2, n\theta) = \frac{P_2(\theta^2)(1-P_\theta)}{P_2(\theta^2)(1-P_\theta)(1-P_2(\theta^2)P_\theta}$$

  That can be rewritten as:

$$P_3(\theta^2, n\theta) = \frac{1}{1+(\frac{1-P_0}{P_0})(\frac{1-P_\theta}{P_\theta})^2}$$

Knowing from the equations above that $\frac{1-P_2(\theta)}{P_2(\theta)} = (\frac{1-P_0}{P_0})(\frac{1-P_\theta}{P_\theta})^2$, $P_3(\theta^2, n\theta)$ can be rewritten as follows:

$$P_3(\theta^2, n\theta) = \frac{1}{1+(\frac{1-P_0}{P_0})(\frac{1-P_\theta}{P_\theta})^2(\frac{P_\theta}{1-P_\theta})}$$

That is:

$$P_3(\theta^2, n\theta) = \frac{1}{1+(\frac{1-P_0}{P_0})(\frac{P_\theta}{1-P_\theta})^{-1}}$$

- At time $t = T$, after having received k violent signals and $T - k$ non-violent signals, woman's posterior will be:

$$P_T(\theta^k, n\theta^{T-k}) = \frac{1}{1+(\frac{1-P_0}{P_0})(\frac{P_\theta}{1-P_\theta})^{(T-2k)}}$$